# SECTION 3.0 – EXISTING ENVIRONMENT AND IMPACTS ANALYSIS

## INTRODUCTION TO ENVIRONMENTAL ANALYSIS

Section 3.0 examines the potential environmental impacts of the project and project alternatives. This section includes analyses of the environmental issue areas listed below:

3.1 OPERATIONAL SAFETY/RISK OF ACCIDENTS
3.2 WATER QUALITY
3.3 BIOLOGICAL RESOURCES
3.4 COMMERCIAL AND SPORTS FISHERIES
3.5 LAND USE/RECREATION
3.6 AIR QUALITY
3.7 NOISE
3.8 VEHICULAR AND RAIL TRANSPORTATION
3.9 VISUAL RESOURCES/LIGHT AND GLARE
3.10 CULTURAL RESOURCES
3.11 GEOLOGICAL RESOURCES/STRUCTURAL INTEGRITY REVIEW
3.12 ENVIRONMENTAL JUSTICE

Each issue area section provides background information and describes the environmental setting (baseline conditions) to help the reader understand the conditions that would cause an impact to occur. In addition, each section describes how an impact is determined to be "significant" or "less than significant". Finally, the individual sections recommend mitigation measures to reduce significant impacts. Throughout Section 3.0, both impacts and the corresponding mitigation measures are identified by a bold **letter-number designation** (e.g., Impact **BIO-1** and mitigation measure **BIO-1a**).

## ASSESSMENT METHODOLOGY

### Environmental Baseline

The analysis of each issue area begins with an examination of the existing physical setting (baseline conditions as determined pursuant to section 15125(a) of the State CEQA Guidelines) that may be affected by the Proposed Project. The effects of the Proposed Project are defined as changes to the environmental setting that are attributable to project components or operation.

## Significance Criteria

Significance criteria are identified for each environmental issue area. The significance criteria serve as a benchmark for determining if a component action will result in a significant adverse environmental impact when evaluated against the baseline. According to State CEQA Guidelines section 15382, a significant effect on the environment means "…a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project…"

## Impact Analysis

The impact analysis focuses both on routine operating conditions of the marine terminal and accidents that could occur during routine operations. Routine operations are those daily activities involved in receipt of crude and transfer of product between vessels, and the transit of vessels from the Golden Gate to/from the marine terminal. Accident conditions addressed include fire, explosions, and spills, and their resultant consequences. This document addresses briefly impacts from tankering along the outer coast.

As part of the impact analyses, the consequences of oil spills that could result from accidents are evaluated. The Unocal Marine Terminal Lease Consideration EIR (Chambers Group 1994), Shore Terminal's Oil Spill Response Plan (BlueWater Consultants 2001), and pertinent Clean Bay oil spill trajectory models as contained in Wickland's Application Responses and Supporting Appendices (Wickland 1998) contained extensive oil spill modeling that show that oil spread can potentially cover the entire area between I-80 and the Delta entrance, which is near West Pittsburgh. Thus, it is assumed that any sensitive resources throughout that area could be oiled. The analyses for accident conditions in this EIR examine the potential impacts to sensitive environmental resources between I-80 and the Delta entrance, and provide specific mitigation to be conducted by Shore to reduce or eliminate impacts. The primary analysis focuses on the terminal and the area between I-80 and the Delta, with secondary and tertiary emphasis on the Bay and outer coast, respectively.

Impacts are classified as:

- **Class I** (significant adverse impact that remains significant after mitigation);
- **Class II** (significant adverse impact that can be eliminated or reduced below an issue's significance criteria);
- **Class III** (adverse impact that does not meet or exceed an issue's significance criteria); or
- **Class IV** (beneficial impact).

A determination will be made, based on the analysis of any impact within each affected environmental issue area and compliance with any recommended mitigation measure(s), of the level of impact remaining in comparison to the pertinent significance criteria. If the impact remains significant, at or above the significance criteria, it is deemed to be Class I. If a "significant adverse impact" is reduced, based on compliance with mitigation, to a level below the pertinent significance criteria, it is determined to no longer have a significant effect on the environment, i.e., to be “less than significant” (Class II). If an action creates an adverse impact above the baseline condition, but such impact does not meet or exceed the pertinent significance criteria, it is determined to be adverse, but less than significant (Class III). An action that provides an improvement to an environmental issue area in comparison to the baseline information is recognized as a beneficial impact (Class IV).

**Formulation of Mitigation Measures and Mitigation Monitoring and Reporting Program**

When significant impacts are identified, feasible mitigation measures are formulated to eliminate or reduce the intensity of the impacts and focus on the protection of sensitive resources. The effectiveness of a mitigation measure is subsequently determined by evaluating the impact remaining after its application. Those impacts meeting or exceeding the impact significance criteria after mitigation are considered residual impacts that remain significant (Class I). Implementation of more than one mitigation measure may be needed to reduce an impact below a level of significance. The mitigation measures recommended in this document are identified in the impact assessment sections and presented in a Mitigation Monitoring and Reporting Program (MMRP). The MMRP is provided in Section 8.0.

If any mitigation measures become incorporated as part of a project’s design, they are no longer considered mitigation measures under the CEQA. If they eliminate or reduce a potentially significant impact to a level below the significance criteria, they eliminate the potential for that significant impact since the "measure" is now a component of the action. Such measures incorporated into the project design have the same status as any “applicant proposed measures.” The CSLC’s practice is to include all measures to eliminate or reduce the environmental impacts of a Proposed Project, whether applicant proposed or recommended mitigation, in the MMRP.

**Impacts of Alternatives**

Section 2.4 provides a list, description and map that identify alternatives to the Proposed Project. Each issue area in Section 3.0 presents the impact analysis for each alternative scenario. A summary of the collective impacts of each alternative in comparison with the impacts of the Proposed Project is to be included within the Executive Summary Section.

**Cumulative Impacts**

Section 4.0 provides a list and map that identifies other related future projects near the location of the Proposed Project and alternatives. Each issue area in Section 3.0 is discussed in Section 4.0 and presents the cumulative impact scenario, the focus of which is to identify the potential impacts of the project that might not be significant when considered alone, but that might contribute to a significant impact when viewed in conjunction with the other projects.

## 3.1 OPERATIONAL SAFETY/RISK OF ACCIDENTS

### 3.1.1 Introduction

This section describes those aspects of the existing environment that may impact operational safety, or that may be affected by an accident associated with the operation of the marine terminal, including transportation of crude oil and petroleum products to and from the terminal. A physical description of the Shore marine terminal is detailed in Section 2.0. This section begins with a summary of laws and regulations that may affect the safety and potential risk from the facility and its operation. This is followed by a description of measures in place to allow the safe movement of marine vessels within the Bay and to respond to emergency situations. Also included are a summary of the existing vessel traffic levels and patterns and other marine terminals within the Bay Area, and a summary of the historical casualties involving tank vessels and marine terminals within the Bay Area. Finally, this section analyzes the potential for impacts and presents appropriate mitigation.

### 3.1.2 Existing Conditions

#### 3.1.2.1 Regulatory Setting

Many laws and regulations are currently in place that regulate marine terminals, vessels calling at marine terminals, and emergency response/contingency planning. Responsibilities for enforcing or executing these laws and regulations fall to various international, federal, state, and local agencies. The various agencies and their responsibilities are summarized below.

International Maritime Organization (IMO)

The major body governing the movement of goods at sea is the IMO, which does so through a series of international protocols. Individual countries must approve and adopt these protocols before they become effective. The International Convention for the Prevention of Pollution from Ships (MARPOL 73/78 and amendments) governs the movement of oil and specifies tanker construction standards and equipment requirements. Regulation 26 of Annex I of MARPOL 73/78 requires that every tanker of 150 tons gross tonnage and above shall carry on board a shipboard oil pollution emergency plan approved by IMO. The U.S. implemented MARPOL 73/78 with passage of the Act of 1980 to Prevent Pollution from Ships. The IMO (IMO 1992) has also issued “Guidelines for the Development of Shipboard Oil Pollution Emergency Plans” to assist tanker owners in preparing such plans that comply with the cited regulations and to assist governments in developing and enacting domestic laws which give force to and implement the cited regulations. Plans that meet the 1990 Oil Pollution Act (OPA 90) and the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act (California SB 2040) requirements also meet IMO requirements. Traffic Separation Schemes (TSSs), must be approved by the IMO, such as the approved TSSs off the entrances to San Francisco Bay and the Santa Barbara Channel.

The IMO adopted an amendment to the International Convention for Safety of Life at Sea (SOLAS) with provisions entitled "Special Measures to Enhance Maritime Safety" which became effective in 1996. These provisions allow for operational testing during port state examinations to ensure that masters and crews for both U.S. and international vessels are familiar with essential shipboard procedures relating to ship safety. The U.S. Coast Guard (USCG) Marine Safety Office conducts these port state examinations as part of their vessel inspection program.

Federal Agencies

A number of federal laws regulate marine terminals and vessels. These laws address, among other things, design and construction standards, operational standards, and spill prevention and cleanup. Regulations to implement these laws are contained primarily in Titles 33 (Navigation and Navigable Waters), 40 (Protection of Environment), and 46 (Shipping) of the Code of Federal Regulations (CFR). The most recent act to address spill prevention and response is OPA 90.

OPA 90 was enacted to expand prevention and preparedness activities, improve response capabilities, ensure that shippers and oil companies pay the costs of spills that do occur, and establish an expanded research and development program. The Act also establishes a $1 billion Oil Spill Liability Trust Fund, funded by a tax on crude oil received at refineries. A Memorandum of Understanding (MOU) was established to divide areas of responsibility. The USCG is responsible for tank vessels and marine terminals, the Environmental Protection Agency (EPA) for tank farms, and the Research and Special Programs Administration (RSPA) for pipelines. Each of these agencies has developed regulations for their area of responsibility.

All facilities and vessels that have the potential to release oil into navigable waters are required by OPA 90 to have up-to-date oil spill response plans and to have submitted them to the appropriate federal agency for review and approval. Of particular importance in OPA 90 is the requirement for facilities and vessels to demonstrate that they have sufficient response equipment under contract to respond to and clean up a worst-case spill.

Other key laws addressing oil pollution include:

- Federal Water Pollution Control Act of 1972,
- Clean Water Act of 1977,
- Water Quality Act of 1987,
- Act of 1980 to Prevent Pollution from Ships,
- Resource Conservation and Recovery Act (RCRA) of 1978,
- Hazardous and Solid Waste Act of 1984, and
- Refuse Act of 1899.

Responsibilities for implementing and enforcing the federal regulations addressing terminals, vessels, and pollution control fall to a number of agencies, as described in the following sections.

United States Coast Guard (USCG)

The USCG, through Title 33 (Navigation and Navigable Waters) and Title 46 (Shipping) of the CFR, is the federal agency responsible for vessel inspection, marine terminal operations safety, coordination of federal responses to marine emergencies, enforcement of marine pollution statutes, marine safety (navigation aids, etc.), and operation of the National Response Center (NRC) for spill response, and is the lead agency for offshore spill response. The USCG implemented a revised vessel boarding program in 1994 designed to identify and eliminate substandard ships from U.S. waters. The program pursues this goal by systematically targeting the relative risk of vessels and increasing the boarding frequency on high risk (potentially substandard) vessels. Each vessel's relative risk is determined through the use of a matrix that factors the vessel's flag, owner, operator, classification society, vessel particulars, and violation history. Vessels are assigned a boarding priority from I to IV, with priority I vessels being the potentially highest risk. The USCG is also responsible for reviewing marine terminal Operations Manuals and issuing Letters of Adequacy upon approval. At the present time, the USCG relies on California State Lands Commission (CSLC) to review Operations Manuals and inspect terminals in the San Francisco Bay. The USCG issued regulations under OPA 90 addressing requirements for response plans for tank vessels, offshore facilities, and onshore facilities that could reasonably expect to spill oil into navigable waterways.

Because studies have shown that the use of double-hull vessels will decrease the probability of releases when tank vessels are involved in accidents, the USCG issued regulations addressing double-hull requirements for tank vessels. The regulations establish a timeline for eliminating single-hull vessels from operating in the navigable waters or the Exclusive Economic Zone of the United States after January 1, 2010, and double-bottom or double-sided vessels by January 1, 2015. Only vessels equipped with a double hull, or with an approved double containment system will be allowed to operate after those times. The phase-out timeline is a function of vessel size, age, and whether it is equipped with a single hull, double bottom, or double sides. The phase out began in 1995 with 40-year-old or older vessels equipped with single hulls between 5,000 and 30,000 gross tons, 28 year or older vessels equipped with single hulls over 30,000 gross tons, and 33 year or older vessels equipped with double bottoms or sides over 30,000 gross tons. All new tankers delivered after 1993 must be double hulled. Double-bottom or double-sided vessels can essentially operate 5 years longer than single-hull vessels.

Environmental Protection Agency (EPA)

The EPA is responsible for the National Contingency Plan and acts as the lead agency in response to an onshore spill. EPA also serves as co-chairman of the Regional Response Team, which is a team of agencies established to provide assistance and guidance to the on-scene coordinator (OSC) during the response to a spill. The EPA also regulates disposal of recovered oil and is responsible for developing regulations for Spill Prevention, Control, and Countermeasures (SPCC) Plans. SPCC Plans are required for nontransportation-related onshore and offshore facilities that have the potential to spill oil into waters of the United States or adjoining shorelines. Shore Terminals has a current SPCC Plan (Shore Terminals 2002).

Department of Commerce through the National Oceanic and Atmospheric Administration (NOAA)

NOAA provides scientific support for response and contingency planning, including assessments of the hazards that may be involved, predictions of movement and dispersion of oil and hazardous substances through trajectory modeling, and information on the sensitivity of coastal environments to oil and hazardous substances. They also provide expertise on living marine sources and their habitats, including endangered species, marine mammals and National Marine Sanctuary ecosystems, and information on actual and predicted meteorological, hydrological, and oceanographic conditions for marine, coastal, and inland waters, and tide and circulation data for coastal waters.

Department of the Interior (DOI)

DOI, through its various offices, provides expertise during spills in a number of areas, as described below:

- U.S. Fish and Wildlife Service (USFWS) – Anadromous and certain other fishes and wildlife, including endangered and threatened species, migratory birds, and certain marine mammals; waters and wetlands; and contaminants affecting habitat resources.

- U.S. Geological Survey (USGS) – Geology, hydrology (groundwater and surface water), and natural hazards.

Department of Defense (DOD)

DOD, through the U.S. Army Corps of Engineers (Corps), is responsible for reviewing all aspects of a project and/or spill response activities that could affect navigation. The Corps has specialized equipment and personnel for maintaining navigation channels, removing navigation obstructions, and accomplishing structural repairs.

<u>State Agencies</u>

California State Lands Commission (CSLC)

Chapter 1248 of the Statutes of 1990 (SB 2040), the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act, established a comprehensive approach to prevention of and response to oil spills. The CSLC Marine Facilities Division is responsible for governing marine terminals. Through two California Code of Regulations (CCR) §2300 through 2571, the Marine Facilities Division established a comprehensive program to minimize and prevent spills from occurring at marine terminals, and to minimize spill impact should one occur. These regulations established a comprehensive inspection-monitoring plan whereby CSLC inspectors monitor transfer operations on a continuing basis. An inspection is conducted annually, and the Shore marine terminal was subject to a comprehensive "audit," including underwater and above wharf, structural inspection in October 1998. This inspection included an evaluation of mechanical, electrical, and fire detection/suppression equipment. Details on the structural inspection are presented in Section 3.11. The standards generated by the proposed Marine Oil Terminal Engineering and Maintenance Standards (MOTEMS) provide specific requirements for subsequent audits and engineering inspections.

CSLC's marine terminal regulations are similar to, but more comprehensive than, federal regulations in the area of establishing exchange of information between the terminal and vessels, information that must be contained in the Declaration of Inspection, requirements for transfer operations, and information that must be contained in the Operations Manual. All marine terminals are required to submit updated Operations Manuals to CSLC for review and approval. CSLC regulations also require that prior to the commencement of transfer of persistent oil, a boom shall be deployed to contain any oil that might be released. Marine terminals subject to high velocity currents, where it may be difficult or ineffective to pre-deploy a boom, are required to provide sufficient boom, trained personnel, and equipment so that at least 600 feet of boom can be deployed for containment within 30 minutes.

A requirement that each marine oil terminal operator must implement a marine oil terminal security program is contained in Section 2430 of CCR Title 2, Division 3, Chapter 1, Article 5.1. At a minimum, each security program must:

- Provide for the safety and security of persons, property, and equipment on the terminal and along the dockside of vessels moored at the terminal;
- Prevent and deter the carrying of any weapon, incendiary, or explosive on or about any person inside the terminal, including within his or her personal articles;
- Prevent and deter the introduction of any weapon, incendiary, or explosive in stores or carried by persons onto the terminal or to the dockside of vessels moored at the terminal; and
- Prevent or deter unauthorized access to the terminal and to the dockside of vessels moored at the terminal.

The Marine Facilities Division has also issued regulations on the following:

- Marine Terminal Personnel Training and Certification,
- Structural Requirements for Vapor Control Systems at Marine Terminals, and
- Marine Oil Terminal Pipelines.

California Department of Fish and Game (CDFG)

The Office of Oil Spill Prevention and Response (OSPR) was created within the CDFG to adopt and implement regulations and guidelines for spill prevention, response planning, and response capability. Final regulations regarding oil spill contingency plans for vessels and marine facilities were issued in November 1993, and last updated in October 2002. These regulations are similar to, but more comprehensive than, the federal regulations. The regulations require that tank vessels, barges, and marine facilities develop and submit their comprehensive oil spill response plans to OSPR for review and approval.

OSPR's regulations require that marine facilities and vessels be able to demonstrate that they have the necessary response capability on hand or under contract to respond to specified spill sizes, including a worst-case spill. The regulations also require that a risk and hazard analysis be conducted on each facility. This analysis must be conducted in accordance with procedures identified by the American Institute of Chemical Engineers (AIChE).

SB 2040 established financial responsibility requirements and required that Applications for Certificate of Financial Responsibility be submitted to OSPR. California's requirement for financial responsibility is in excess of the federal requirements.

SB 2040 also requires the OSPR to develop a State Oil Spill Contingency Plan. In addition, each major harbor was directed to develop a Harbor Safety Plan addressing navigational safety, including tug escort for tankers. The Harbor Safety Committee of the San Francisco Bay Region issued its Harbor Safety Plan in 1992, and has issued annual updates. The plan contains several recommendations to improve safety. One recommendation, first implemented in May 1993 through OSPR issuance of the then interim regulations (now permanent), requires that all tank vessels carrying more than 5,000 tons of oil have available a standby tug or be escorted by one or more tugs when transiting through certain zones, as shown in Figure 3.1-1. As can be seen from Figure 3.1-1, tug escorts are required while tankers are transiting the Carquinez Strait and Suisun Bay.

California Coastal Commission (CCC)

The CCC and the San Francisco Bay Conservation and Development Commission (BCDC) have oil spill statutory authority under the following two statutes: California Coastal Act of 1976 and Lempert-Keene-Seastrand Oil Spill Prevention and Response Act of 1990. The CCC responsibilities include all of California's coastal shoreline, including ports and harbors, except for the San Francisco Bay, which falls under the jurisdiction of the BCDC. Responsibilities include:

- Review of coastal development projects related to energy and oil infrastructure for compliance with the Coastal Act and consistency with the Coastal Zone Management Act;

**Figure 3.1-1  Tug Escort Zones**

- Attendance at statewide and regional Harbor Safety Committee Area committee and subcommittee meetings (e.g., dispersants, sensitive sites, Area Contingency Plan update, oiled wildlife operations);
- Review of regulations for oil spill prevention and response, and input on these regulations' consistency with Coastal Act regulations and policies;
- Review of oil spill contingency plans for marine facilities located in the coastal zone/Bay Area, and oil spill response plans for facilities located on the outer continental shelf;
- Participation in the State Interagency Oil Spill Committee (SIOSC), SIOSC Review Subcommittee, and Oil Spill Technical Advisory Committee meetings and assignments;
- Participation in studies that will improve oil spill prevention, response, and habitat restoration;
- Participation in oil spill drills; and
- Participation in the development of planning materials for oiled wildlife rehabilitation facilities.

#### 3.1.2.2 Factors Affecting Vessel Traffic Safety

This section summarizes environmental conditions described in the USCG Pilot, Volume 7, 34th Edition, 2002, and the San Francisco, San Pablo and Suisun Bays Harbor Safety Plan Year 2002 (Harbor Safety Committee 2002), that could have an impact on vessel safety in the Bay Area. More detailed information on many of the areas can be found in the existing conditions description of other sections (e.g., detailed meteorological data can be found in the air quality section).

<u>Winds</u>

Bay Area weather is seasonably variable with three discernible seasons for marine purposes, as discussed below.

Winter Winds

Winter winds from November to February shift frequently and have a wide range of speeds depending on the procession of offshore high- and low-pressure systems. Overall, calms occur between 15 and 40 percent of the time inside the Bay, and 10 to 12 percent outside the Bay. Extreme wind conditions of 50 knots gusting to 75 knots have occurred during the winter. The strongest winds tend to come from the southeast to southwest ahead of a cold front.

### Spring Winds

Spring tends to be the windiest season, with average speeds in the Bay of 6 to 12 knots. Extremes are less likely than during the winter, but wind speeds from 17 to 28 knots occur up to 10 percent of the time. The approaches to the Golden Gate receive heavier weather and may experience 17- to 28-knot winds up to 40 percent of the time. Wind direction stabilizes as the Pacific High Pressure System becomes the dominant weather influence. Northwesterly winds are generated and reinforced by the sea breeze. Inside the Bay, winds are channeled and vary from northwest to southeast.

### Summer Winds

Summer winds are the most constant and predictable. The winds outside the Golden Gate are normally from northwest to north and are generated by the strong Pacific High. This condition lasts through October until the system weakens and the winter cycle starts again. Winds inside the Bay are local depending on the land contours acting on the onshore flow. One of the few occurrences that will alter this pattern is when a high-pressure system settles over Washington and Oregon. When that happens, a northeast flow develops, bringing warm, dry air with it. This will clear away the summer fog, but also will dry the landscape and increase fire dangers.

## Fog

Fog is a well-known weather condition in the Bay Area, particularly around the Golden Gate. It is most common during the summer, occasional during fall and winter, and infrequent during spring. The long-term fluctuations are not predictable, but daily and seasonal cycles are.

### Summer Fog

Summer fog depends on several conditions. The Pacific High becomes well established off the coast and maintains a constant northwest wind. It also drives the cold California Current south and causes an upwelling of cold water along the coast. Air closest to the surface becomes chilled so that the temperature increases with altitude. This forms an inversion layer at about 500 to 1,500 feet. Moist, warm ocean air moving toward the coast is cooled first by the California Current, then more by cold coastal water. Condensation occurs and fog will form to the height of the inversion layer. This happens often enough to form a semi-permanent fog bank off the Golden Gate during the summer. Under normal summer conditions, a daily cycle is evident. A sheet of fog forms off the Golden Gate headlands during the morning and becomes more extensive as the day passes. As the temperatures in the inland valleys rise, a local low pressure area is created, and a steady indraft takes place. By late afternoon, the fog begins to move through the Golden Gate at a speed of about 14 knots on the afternoon sea breeze. Once inside the Bay, it is carried by local winds. In general, the north part of the Bay is the last to be enveloped and the first to clear in the morning. The flow is so strong at times that the sea fog penetrates as far east as Sacramento and Stockton. If it continues for a few days, cooler ocean air replaces the warm valley air and causes the sea breeze mechanism to break down. Winds diminish and the Bay Area clears for a few days. Slowly the valley reheats and starts the cycle again.

Winter Fog

Winter fog is usually radiation fog or “tule” fog. With clear skies and light winds, land temperature drops rapidly at night. In low, damp places, such as the Delta and Central Valley (where tules and marsh plants grow), it results in a shallow radiation fog (moist sea air reacting to cold land mass) that may be quite dense. In contrast to the summer fog that moves from sea to land at about 14 knots, the winter tule fogs move slowly seaward at about 1 knot.

## Currents

The currents at the entrance to San Francisco Bay are variable, uncertain, and at times attain considerable velocity. Immediately outside the bar is a slight current to the north and west known as the Coast Eddy Current. The currents that have the greatest effect on navigation in the Bay and out through the Golden Gate are tidal in nature.

Golden Gate Currents

In the Golden Gate, the flood or incoming current sets (direction of flow) straight in (east) with a slight tendency to the north shores, and with heavy turbulence at both Lime and Fort Points when the flood is strong. This causes an eddy or circular current between Point Lobos and Fort Point.

The ebb or outgoing current has been known to reach more than 6.5 knots between Lime and Fort Points. Its general set is westward. As with the flood, it causes eddies between Point Lobos and Fort Point. A heavy rip and turbulence extend to a 0.25 mile south of Point Bonita.

In the Golden Gate, the maximum flood current occurs about 1.5 hours before high water, with the maximum ebb occurring about 1.5 hours before low water. The average current velocities are 3 knots for the flood and 3.5 knots for the ebb.

The flood sets to the northeast and causes swirls and eddies. This is most pronounced between the Golden Gate, Angel Island, and Alcatraz Island. The current sets through Raccoon Strait (north of Angel Island), taking the most direct path to the upper Bay and the Delta area. The ebb current inside the Golden Gate is felt on the south shore first. The duration of the ebb is somewhat longer than the flood due to the addition of runoff from the Sacramento and San Joaquin River systems.

Carquinez Strait Currents

Through the Carquinez Strait and Suisun Bay, the magnitude of tidal currents is on the order of several knots varying with flow direction and tide conditions. Based on the NOAA produced Carquinez Strait Current Table, maximum ebb and flood currents of 3.64 kts and 2.85 kts respectively have been predicted for 2004 in the Carquinez Strait (WWW Tide and Current Predictor, http://tbone.biol.sc.edu/tide/tideshow.cgi). The maximum predicted currents at the terminal can be predicted by multiplying the maximum currents in the Carquinez Strait by the NOAA ration of 0.6 for the terminal. Thus, the maximum predicted currents for the terminal are 2.18 kts ebb and 1.71 kts flood. Currents throughout the area are strong enough to be a serious consideration for ship docking.

A current meter was installed at the terminal sometime around 2000. Due to the placement of the meter behind the wharf piles, no usable data was collected. A viable location for the meter could not be located and the meter was removed from service.

Tides

Tides in the San Francisco Bay Area are mixed. Usually two cycles of high and low tides occur daily, but with inequality of the heights of the two. Occasionally, the tidal cycle will become diurnal (only one cycle of tide in a day). As a result, depths in the Bay are based on mean lower water level (MLLW), which is the average height of the lower of the two daily low tides. The mean range of the tide at the Golden Gate is 4.1 feet, with a diurnal range of 5.8 feet. During the periodic maximum tidal variations, the range may reach as much as 9 feet and have lowest low waters 2.5 feet below MLLW datum.

The tide in Carquinez Strait occurs two to three hours after it occurs at the Golden Gate. Suisun Bay, then follows later than the Strait. The mean rise of the tide in Carquinez Strait is approximately 5 to 5.5 feet. Two sites near the Shore marine terminal record tide data. Relative to MLLW, Benicia has a MHHW at 5.1 feet and a mean tide level of 2.7 feet; Suisun Slough entrance has a MHHW at 4.6 feet and a mean tide level of 2.4 feet. The maximum predicted tide for 2004 is 6.58 feet and the minimum is –1.17 feet (WWW Tide and Current Predictor, http://tbone.biol.sc.edu/tide/tideshow.cgi).

Water Depths

Water depth in the Bay Area is generally shallow and subject to silting from river runoff and dredge spoil recirculation. Therefore, channel depths must be regularly maintained and shoaling must be prevented in order to accommodate deeper draft vessels. The Corps tries to maintain the depth of the main ship channel from the Pacific Ocean into the Bay at 55 feet; however, the continual siltation creates main channel depths ranging between 49 and 55 feet. Deep draft vessels in the Bay must carefully navigate many of the main shipping channels because channel depths in some areas are barely sufficient for navigation by some modern larger vessels, especially when deeply laden. While the Corps surveys specific areas of concern on a frequent basis, recent survey charts may not show all seabed obstructions or shallow areas due to highly mobile bottoms (due to localized shoaling). In addition, recent observations indicate that manmade channels may influence tidal currents to a greater degree than earlier anticipated. Additional information on water depth and quality at the Shore marine terminal is found in Section 3.2.

### 3.1.2.3 Bay Area Vessel Traffic Control Systems

Navigational Description

A Traffic Separation Scheme (TSS) has been established off the entrance of San Francisco Bay. It includes three directed traffic areas, each with one-way inbound and outbound traffic lanes separated by defined separation zones, a Precautionary Area, and a pilot boat cruising area. The TSS is recommended for use by vessels approaching or departing the Bay, but is not necessarily intended for tugs, tows, or other small vessels that traditionally operate outside the usual steamer lanes or close inshore. This TSS has been adopted by the IMO. Figure 3.1-2 depicts the TSS area and navigation aids.

There are seven Regulated Navigation Areas (RNAs) in San Francisco Bay. The USCG established these RNAs in 1993 with input from the Harbor Safety Committee, based on the voluntary traffic routing measures that were previously in existence. The RNAs are codified in 46 CFR 165.1116. RNAs organize traffic flow patterns to reduce vessel congestion where maneuvering room is limited; reduce meeting, crossing, and overtaking situations between large vessels in constricted channels; and limit vessel speed. The seven RNAs are shown in Figure 3.1-3. All vessels 1,600 gross tons or more and tugs with a tow of 1,600 gross tons or more (referred to here as large vessels) navigating in the RNAs are required by the regulations to:

- not exceed a speed of 15 knots through the water, and
- have engine(s) ready for immediate maneuver and operate engine(s) in a control mode and on fuel that will allow for an immediate response to any engine order.

Each of the seven RNAs are described below.

San Francisco Bay RNA

The San Francisco Bay RNA consists of the water area in the Golden Gate east of the COLREGS Demarcation Line (33 CFR 80.1142), the Central Bay including Racoon Strait, and the existing charted Precautionary Area east of Alcatraz Island (Figure 3.1-3). Traffic lanes have been established in this RNA to separate opposing traffic and reduce vessel congestion. Because of shoals and rocks in the Central Bay, the Central Bay Two-way Deep Water Traffic Lane (DWTL) north of Harding Rock, provides the best water depth safety margin for inbound vessels with a draft of 45 feet or greater, and for outbound vessels with a draft of 28 feet or greater. Such deep draft vessels are required to use the DWTL. All other vessels are encouraged to use the Central Bay Traffic Lanes so that vessel traffic in the DWTL is kept to a minimum. Regulations

## Figure 3.1.2 Offshore Traffic Separation Scheme

**Figure 3.1.3  Regulated Navigation Areas**

prohibit a large vessel from entering the DWTL when another large vessel is navigating therein when either vessel is carrying certain dangerous cargo (as defined in 33 CFR 160.203), bulk petroleum products, or is a tank vessel in ballast, if such entry could result in meeting, crossing, or overtaking the other vessel.

Because vessels are converging or crossing in such a manner that one-way traffic flow patterns cannot be established, there are two Precautionary Areas in the RNA: (1) the Golden Gate Precautionary Area, which encompasses the waters around the Golden Gate between the Golden Gate and the Central Traffic Lanes; and (2) the Central Bay Precautionary Area, which encompasses the large portion of the central bay and part of the lower bay. It is recommended that all vessels navigating in these Precautionary Areas be aware of the joining lanes and DWTL so as to anticipate the movements of the other vessels.

Oakland Harbor RNA

The Oakland Harbor RNA encompasses the Oakland Bar Channel, Oakland Outer Harbor Entrance, and Middle Harbor and Inner Harbor Entrance Channels. Large vessels are prohibited from entering the RNA if they could meet, cross, or overtake another large vessel.

Southampton Shoal Channel/Richmond Harbor RNA

This RNA encompasses Southampton Shoal Channel, the Richmond Long Wharf Maneuvering Area, the Richmond Harbor Entrance Channel, and Point Potrero Reach (Figure 3.1-3). These are dredged channels and areas within which maneuvering room is severely limited. In addition, the Southampton Shoal Channel is transited by a high number of laden tank vessels, and vessels carrying dangerous cargo or bulk petroleum. The Richmond Long Wharf Maneuvering Area, between the Richmond Harbor Entrance Channel and Southampton Shoal Channel, often has vessels operating at low speeds where maneuvering is restricted. Large vessels are prohibited from entering the RNA if they could meet, cross, or overtake another large vessel.

North Ship Channel RNA and San Pablo Strait Channel RNA

Both these RNAs consist of the existing charted channels and delineate the only areas where the depths of water are sufficient to allow safe transit of large vessels. The existence of strong tidal currents in these channels severely restricts the ability of large vessels to safely maneuver to avoid smaller vessels. The general regulations apply to these areas; however, the addition of special regulations is not justified at this time.

Pinole Shoal Channel RNA

This RNA is a constricted waterway, the use of which is currently restricted to vessels with a draft greater than 20 feet or towboats with tows drawing more than 20 feet. Regulations prohibit a large vessel from entering the Pinole Shoal Channel when another large vessel is navigating therein when either vessel is carrying certain dangerous cargo, bulk petroleum products, or is a tank vessel in ballast, if such entry could result in meeting, crossing, or overtaking the other vessel.

Southern Pacific Railroad RNA

This RNA consists of a small circular area, 200 yards in radius, centered on the middle of the channel under the Southern Pacific Railroad Bridge that spans the Carquinez Strait between Benicia and Martinez. Because of the limited horizontal clearance of the bridge, large vessels are prohibited from transiting this RNA when visibility is less than 1,000 yards.

Position Reporting, Communication, and Surveillance

The USCG Vessel Traffic Center (VTC) at Yerba Buena Island is the communications center for the TSS. The TSS was extensively upgraded in 1997. The upgraded system includes state-of-the-art computer digitized radar displays shown on electronic charts. The new system automated many of the controller's duties, allowing more time for monitoring traffic.

Pilotage

Pilotage in and out of the San Francisco Bay and adjacent to the waterways is compulsory for all vessels of foreign registry and United States vessels under enrollment not having a federal licensed pilot on board. The San Francisco Bar Pilots provide pilotage to ports in San Francisco Bay and to ports on all tributaries to the Bay. Pilots board the vessels in the Pilot Boarding Area outside the Golden Gate entrance, and then pilot the vessels to their destinations. Pilots normally leave the vessels after docking and reboard the vessels when they are ready to leave and pilot them to sea or other destinations within the Bay Area.

Navy pilots operate military vessels and Military Sealift Command (MSC) vessels. The MSC vessels are normally boarded in the Pilot Boarding Area outside the Golden Gate entrance. The military vessels are boarded either outside the Golden Gate entrance or inside the Bay.

Physical Oceanographic Real Time System (PORTS)

The PORTS was installed in the Bay Area in 1995 with OSPR assuming overall responsibility for the system in 1998. The PORTS is designed to provide crucial information in real time to mariners, oil spill response teams, managers of coastal resources, and others about San Francisco Bay's water levels, currents, salinity, and winds. In partnership with NOAA, National Ocean Service (NOS), California OSPR, the USGS, and the local community, the Marine Exchange operates PORTS as a service to those who must make operational decisions based on oceanographic and meteorological conditions in the Bay.

The instruments that collect the information are deployed at strategic locations in the Bay to provide data at critical locations, and to allow now casting and forecasting using a mathematical model of the Bay's oceanographic processes. Data from the sensors are fed into a central collection point; raw data from the sensors are integrated and synthesized into information and analysis products, including graphical displays of PORTS data. These displays are available over the Internet and through a voice response system.

The PORTS station at Benicia Bridge measures currents using an Acoustic Doppler Current Profiler (ADCP), conductivity (salinity), and water temperature. This station is considered extremely important by mariners because the currents in the area are heavily influenced by wind shear and freshwater inputs making the conventional tidal current projections unreliable. Other station sites in the Bay area include the Golden Gate entrance, Redwood City, Alameda, Oakland, Richmond, and Port Chicago.

#### 3.1.2.4 Bay Area and Shore Terminal Vessel Traffic

Bay Area

Many types of marine vessels call at terminals in the San Francisco Bay Area, including passenger vessels, cargo vessels, tankers, tow/tug vessels, dry cargo barges, and tank barges. Section 2.0 presents information on the number of vessel trips. This information is also presented here for easy reference.

Lightering (transfer of oil from one vessel to another) takes place in Anchorage No. 9. Lightering is normally conducted from a large tanker, whose draft is too deep to allow it to call at a certain terminal with a full load, to a smaller tanker. Lightering has decreased in the Bay Area since the inception of air quality regulations requiring receiving vessels to be equipped with vapor recovery.

Table 3.1-1 presents information on vessel visits during 2000 (Corps 2001). The numbers in the table represent inbound transits. The number of outbound transits is essentially the same. A vessel that visits multiple terminals is counted at each terminal.

**Table 3.1-1**
**2000 San Francisco Bay Vessel Traffic**

| Location | Type of Vessel | | | | | Total Number of Vessels Visits |
|---|---|---|---|---|---|---|
| | Passenger and Cargo | Tanker | Tow or Tug | Dry Cargo Barge | Tank Barge | |
| San Francisco Bay Entrance | 2,601 | 653 | 310 | 21 | 212 | 3,797 |
| San Francisco Harbor | 27,990 | 96 | 382 | 64 | 30 | 28,562 |
| Redwood City Harbor | 33 | 0 | 144 | 32 | 6 | 215 |
| Oakland Harbor | 3,798 | 11 | 2,243 | 467 | 36 | 6,555 |
| Richmond Harbor | 695 | 353 | 4,300 | 29 | 249 | 5,626 |
| San Pablo Bay and Mare Island Strait | 1,143 | 341 | 1,343 | 506 | 446 | 3,779 |
| Carquinez Strait | 174 | 320 | 1,372 | 267 | 411 | 2,544 |
| **Source: Corps 2001. Waterborne Commerce of the United States Calendar Year 2000 Part 4-Waterways and Harbors Pacific Coast, Alaska, and Hawaii.** | | | | | | |

The Harbor Safety Committee, using data from the Marine Exchange, publishes information on tank vessel arrivals and movements in the Bay area. Table 3.1-2 summarizes these data and Table 3.1-3 shows a breakdown by zone (see Figure 3.1-1 for a definition of the zones). As can be seen from Figure 3.1-2, total vessel arrivals and interbay shifts decreased slightly between 2000 and 2001, however, tanker arrivals and movements increased.

**Table 3.1-2**
**2001 San Francisco Bay Vessel Traffic**

| San Francisco Bay Region Totals | 2001 | 2000 |
|---|---|---|
| Total vessel arrivals | 3,144 | 3,286 |
| Total vessel interbay shifts | 1,450 | 1,706 |
| Tanker arrivals to San Francisco Bay | 784 | 656 |
| Tank ship movements and escorted barge movements | 3,823 | 3,140 |
| Tank ship movements | 2,581 | 2,245 |
| Escorted tank ship movements | 1,197 | 1,020 |
| Unescorted tank ship movements | 1,384 | 1,225 |
| Tank barge movements | 1,242 | 895 |
| Escorted tank barge movements | 668 | 463 |
| Unescorted tank barge movements | 574 | 432 |

**Table 3.1-3**
**Movements by Zone**

| Movements by Zone | Zone 1 | Zone 2 | Zone 4 | Zone 6 | Total |
|---|---|---|---|---|---|
| Total movements | 2,211 | 3,611 | 1 | 1,800 | 7,623 |
| Unescorted movements | 1,111 | 1,847 | 1 | 918 | 3,877 |
| Tank ships | 856 | 1,348 | 1 | 602 | 2,807 |
| Tank barges | 255 | 499 | 0 | 316 | 1,070 |
| Escorted movements | 1,100 | 1,764 | 0 | 882 | 3,746 |
| Tank ships | 742 | 1,149 | 0 | 529 | 2,420 |
| Tank barges | 358 | 615 | 0 | 353 | 1,356 |

**Notes:**
1. **Information is only noted for zones where escorts are required.**
2. **Every movement is counted in each zone transited during the movement.**
3. **Total movements is the total of all unescorted movements and all escorted movements.**
4. **See Figure 3.1-1 for a definition of the zones.**

## Shore Marine Terminal

Table 3.1-4 presents information on the number of tanker and barge calls to the Shore marine terminal by year since 1994. Tanker and tank vessel calls peaked in 2000. The total number of tank vessel calls decreased slightly in 2001 and substantially in 2002. Tankers on route to the Shore marine terminal typically unload at either Shell Martinez or Tesoro, Amorco both just east of I-680 so as to navigate Bullshead Channel. A small number also lighter at Anchorage No. 9. Details on vessel calls at the Shore marine terminal were presented in the Project Description in Section 2.2.5.

**Table 3.1-4**
**Tank Vessel Calls at the Shore Marine Terminal**

| Year | Tanker Calls | Barge Calls | Total Tank Vessel Calls |
|---|---|---|---|
| 1994 | 57 | 57 | 114 |
| 1995 | 39 | 50 | 89 |
| 1996 | 59 | 55 | 114 |
| 1997 | 50 | 102 | 152 |
| 1998 | 64 | 44 | 108 |
| 1999 | 112 | 64 | 176 |
| 2000 | 127 | 97 | 224 |
| 2001 | 111 | 108 | 219 |
| 2002 | 85 | 79 | 164 |

**Source: CSLC, Marine Facilities Division, 2002.**

## Outer Coast

Vessels entering and leaving the Golden Gate entrance to San Francisco Bay do so through the TSS which consists of a circular Precautionary Area with three traffic lanes (northern, main or western, and southern) exiting from the Precautionary Area. In a special one-time study, data compiled by the USCG VTC for November 1993 through July 1994, show that approximately 50 percent of the tankers used the western lane, while approximately 25 percent of the tankers used the north and south lanes, respectively. For all types of vessel traffic, approximately 25 percent used the west lane, while 37 percent used the north and south lanes, respectively. This information is still utilized as current, as no follow up studies have been conducted.

Once outside the Golden Gate, limited information is available on vessel routes once they leave the traffic lanes. Table 3.1-5 presents information on possible tanker origins and destinations, and travel distances from the California coastline when calling at terminals in the San Francisco Bay. Tankers essentially remain at least 50 miles offshore when transiting to and from Alaska, and 25 miles when transiting to and from other locations. Tank barges normally transit at least 15 miles offshore. Vessel calls to marine terminals in San Francisco Bay are shown in Table 3.1-6.

Imported cargo and associated vessel calls are expected to triple from 1995 to 2020 (LTMS 1998). Numbers taken from the Seaport Plan (BCDC and MTC 1997) show a projected increase from approximately 15 million metric tons to 44 million metric tons during this timeframe. These numbers reflect general cargo ports and terminals; commodities handled at proprietary terminals (including the Shore marine terminal) are not included in these projections.

### 3.1.2.5 Vulnerable Resources

Vulnerable resources are those resources that could potentially be harmed by an accident or spill. Biological and water quality resources are addressed in Sections 3.2 and 3.3. Besides commercial vessel traffic in the Bay, a great deal of fishing and recreational boating traffic occurs, as well as ferry service. There were approximately 88,500 ferry/passenger vessel trips in the Bay Area in 2000 transporting approximately 6 million passengers (URS 2002). Currently there are approximately 16,500 boat berths in San Francisco Bay marinas (URS 2002). Fishing and recreational boating are discussed in Section 3.4.

Tank vessels transiting between the Shore marine terminal and the Bay entrance, or terminals located to the west, must pass beneath one or more bridge complexes. The Martinez Union Pacific Railroad Bridge and Benicia-Martinez Highway Bridge are located a little over a 1 mile to the west of the Shore marine terminal. The bridges are essentially parallel to one another and are separated by approximately 150 feet at the navigation channel. The Railroad Bridge is located on the east side of the highway bridge. The Railroad Bridge has seven fixed spans and one vertical lift span, which is across the navigation channel. The navigation opening of the lift span is 291 feet; however, there is a 130-foot width limitation for vessels passing through the opening. The vertical clearance is 70 feet at MHHW while the span is in the closed position and 135 feet when it is open. The navigation channel opening of the highway bridge is 440 feet. The vertical clearance is 135 feet at MHHW.

## Table 3.1-5
## Tanker Original/Destination to/from San Francisco Bay and Distance Traveled from Coast

| Origin | Destination | Typical Distance From Coast (Miles) |
|---|---|---|
| Alaska | SF Bay | 50+ |
| Canada | SF Bay | 25+ |
| Oregon and Washington | SF Bay | 25+ |
| Asia and Hawaii | SF Bay | NA |
| Los Angeles | SF Bay | 25+ |
| Mexico, Panama, and South America | SF Bay | 10+ |
| SF Bay | Oregon and Washington | 25+ |
| SF Bay | Humboldt Bay | 25+ |
| SF Bay | Asia and Hawaii | NA |
| SF Bay | Port San Luis | 10+ |
| SF Bay | Los Angeles | 50+ ANS crude<br>25+ other crude and products |
| SF Bay | Mexico, Panama, and South America | 25+ |

**Sources: USCG and NOAA, undated. Report to Congress on Regulating Vessel Traffic in the Monterey Bay National Marine Sanctuary as Required by Public Laws 102-368 and 102-587. San Francisco Bay Region Marine Exchange, 2002.**

## Table 3.1-6
## Vessel Calls to Marine Terminals in the San Francisco Bay in 2001

| Marine Terminal | Vessels | Barges | Total |
|---|---|---|---|
| Shell Oil, Martinez | 87 | 107 | 194 |
| G.P. Resources | 1 | 19 | 20 |
| San Pedro Marine | 0 | 0 | 0 |
| Tesoro Amorco | 35 | 0 | 35 |
| Tesoro Avon | 14 | 123 | 137 |
| BC Stocking | 0 | 2 | 2 |
| Phillips 66, Rodeo | 73 | 166 | 239 |
| Shore, Martinez | 108 | 111 | 219 |
| Shore, Crockett | 52 | 41 | 93 |
| Chevron, Richmond | 390 | 351 | 741 |
| BP/Arco, Richmond | 12 | 7 | 19 |
| Shore, Richmond | 11 | 172 | 183 |
| Castrol, Richmond | 0 | 4 | 4 |
| Kinder Morgan, Richmond | 9 | 1 | 10 |
| IMTT, Richmond | 33 | 497 | 530* |
| Tosco, Richmond | 5 | 76 | 81 |
| Valero, Benicia – berth #1 | 142 | 82 | 224 |
| Valero, Benicia – berth #2 | 0 | 13 | 13 |
| **Total all Terminals** | 972 | 1,770 | 2,742 |

*** There were an additional 147 transfers to Tugs at this terminal. These vessel calls are not included in the total.**
**Source: CSLC, Marine Facilities Division, 2002.**

The California Department of Transportation is in the process of constructing a new bridge between Benicia and Martinez to carry northbound traffic. The existing highway bridge will be converted to carry only southbound traffic. The new bridge is being constructed adjacent to and east of the existing bridge. Both spans will be east of the Railroad Bridge. The horizontal span across the navigation channel will be 8,800 feet with a vertical clearance of 138 feet at MHW, the same as the existing bridge.

The Carquinez Bridges are located at the western end of the Carquinez Strait. There are two separate bridges, one carrying southbound traffic and one carrying northbound traffic. The channel on each side of the center pier is 998 feet wide. The minimum vertical clearances are 146 feet through the north span and 134 feet through the south span at MHW. An additional bridge is currently being constructed at this location.

The Tesoro Avon terminal is located approximately 1,800 feet east of the Shore wharf.

The Shore terminal is located in a remote area away from populated areas. The nearest residence is over 1.5 miles to the southwest across I-680. The BCDC controls a trail easement that passes through the terminal property crossing over the pipelines that run between the wharf and the tank farm.

#### 3.1.2.6 Bay Area and Shore Terminal Oil Spill Response Capability

Bay Area

All of the marine terminals and all vessels calling at the marine terminals are required to have oil spill response plans and a certain level of initial response capability. However, it is not economically feasible or practical for terminal operators and vessels to each have their own equipment to respond to more than minor spills. Therefore, operators must rely on pooled or contract capabilities.

The vessel and terminal owners use various companies and organizations to provide their response capability. The USCG has created the Oil Spill Removal Organization (OSRO) classification program so that facility and tank vessel operators can contract with and list an OSRO in their response plans in lieu of providing extensive lists of response resources to show that the listed organization can meet the response requirements. Organizations that want to receive a Coast Guard OSRO classification, submit an extensive list of their resources and capabilities to the Coast Guard for evaluation. The State of California has a similar OSRO classification program to allow facility and tank vessel operators to list OSROs in meeting State oil spill response requirements. OSROs currently listed in the Bay area include National Response Corp. (NRC), Clean Seas, Marine Spill Response Corporation (MSRC), and Foss.

Clean Bay, an oil spill cooperative, has been established for the Bay and outer coast areas. An oil spill cooperative is an organization established by a group of companies to provide oil spill response capability. Each company contributes its share of the cost of the cooperative and then has access to the cooperative's equipment and manpower when needed. Oil spill cooperatives also provide training to member company personnel and take part in member company drills on a regular basis. Clean Bay's area of response is San Francisco Bay, including Suisun Bay and Honker Bay to the Antioch Bridge in the Delta, and the outer coast from Fort Bragg in the north to Cape San Martin in the south.

Clean Bay has an extensive inventory of response equipment located throughout the Bay Area. The equipment listed in the current Clean Bay Oil Spill Contingency Plan consists of over 71,000 feet of boom, 30 skimmers, 2 large response vessels, 13 workboats, an oil storage barge, and other ancillary equipment. The Shore Martinez terminal does not belong to Clean Bay; however, the Shore Selby terminal does subscribe to Clean Bay services. As such, Clean Bay would provide response services to the Shore Martinez terminal in the event of a major release for an additional cost over Shore's current services.

The MSRC is the largest, dedicated, standby oil spill response program in the United States, including open water, shoreline, and mid-continent river operations. MSRC response services are available to all Marine Preservation Association (MPA) members, companies that have contracted with MSRC, and on a reimbursable basis. Shore Terminals does not contract with MSRC.

MSRC has extensive equipment in the Bay Area, including facilities at Alameda, Crockett, Martinez, Richmond, and San Francisco. Clean Bay and MSRC are the best equipped OSROs to respond to tanker spills in the ocean outside the Bay.

Foss Environmental Services is a private company providing emergency response services from 24 locations on the west coast, one being Alameda in the Bay area. Foss equipment and capabilities are available to the Shore terminal through their contract with NRC.

<u>Shore Terminal</u>

The Shore Martinez terminal currently contracts with NRC for spill response services, and lists them in their Oil Spill Response Plan as their OSRO for onwater, onshore, and shallow water response. NRC equipment in the Bay Area includes 73 boats, 64,900 feet of boom, 20 skimmers, 80,615 barrel (bbl) of storage capacity, and other miscellaneous equipment. While Shore relies on NRC for spill response, Shore has its own containment boom and response procedures as described in the Project Description in Section 2.0.

#### 3.1.2.7 Spills from Bay Area Marine Terminals and Shore Marine Terminal

<u>Bay Area</u>

The CSLC has been tracking spills from marine terminals since 1992. A total of 128 spills, varying from a teaspoon to 1,092 gallons (26 bbls), occurred during the

10 years from 1992 through 2001. This equates to approximately 13 spills per year. Terminals were the responsible party for approximately 57 percent of the spills, while vessels were responsible for the remaining 43 percent.

Shore Terminal

There has been one spill from the Shore terminal wharf and one pipeline failure during the past 5 years. The spill occurred when a loading arm was not fully drained of fuel oil, the blank flange was not fitted properly on loading arm, and the loading arm dropped into the water releasing approximately 30 gallons of fuel oil into the water. No significant environmental impacts resulted. A pipeline failure at the Shore's upland facility in November 2002 resulted in an estimated 860-gallon release of partially refined petroleum. The release was caused by gasket failure in a pipeline that transfers oil between the Shell refinery and the Shore storage tanks. This release was not associated with the marine terminal portion of the facility.

### 3.1.2.8 Major Vessel Incidents

Over the past 30 years, several incidents involving vessels have drawn public attention. In 1971, a collision of the Oregon Standard and the Arizona Standard under the Golden Gate occurred in heavy fog and resulted in the spillage of approximately 27,600 bbls of bunker heavy fuel oil. Spilled oil impacted the outer coast to the north as far as Double Point (north of Point Reyes Bird Observatory) in Marin County, and to the south near San Gregorio Beach in San Mateo County, as well as within San Francisco Bay. Approximately 4,000 seabirds died as a result of the spill. This incident led to the Bridge to Bridge Radiotelephone Act, which requires all vessels to monitor Channel 13 VHF-FM.

The chemical tanker Puerto Rican experienced an explosion in one of the void spaces surrounding a cargo tank in 1984. This incident resulted in injury to crew members as well as a release of between 25,000 and 35,000 bbls of lubricating oil and bunker fuel oil. The released oil passed through the entire north-south extent of the Gulf of Farallones National Marine Sanctuary impacting the Farallon Islands, Point Reyes, and Bodega Bay. An estimated 2,900 seabirds died as a result of this spill.

In 1989, the tug Standard IV with an oil barge in tow lost control while approaching its berth at the Richmond Long Wharf. The barge struck the pier, destroying a catwalk and parting the bow lines on the tanker "Overseas Juneau." The tanker's bow began to swing away from the pier. The tanker dropped an anchor and hailed a passing light tug. The tug held the tanker's bow against the dock while it made preparations to get underway. The tanker transited to anchorage without any further damage. The barge suffered minor damage and the tug none.

The partially laden T/V Overseas Philadelphia was moored portside at the Wickland Selby marine oil terminal during the afternoon hours of February 20, 1997, when the vessel broke loose from her morring lines and drifted downstream without power in the

Carquinez Strait. As a result, the terminal sustained severe damage to the fixed loading arms and the concrete wharf. Reportedly, 420 gallons of jet fuel was released into the Strait. The cause may have been due to a surge from the passing of another vessel, that caused the breast lines to part and allowed the vessel to swing outward away from the dock. Since no cargo transfer operations were in process at the time of the incident, the spilled contents were that remaining in the loading arms. Within approximately 8 minutes of the incident, the drifting vessel started her engines to safety secure the vessel with the port anchor approximately one nautical mile from the Wickland Selby terminal.

The Singapore-flagged Neptune Dorado was detained in San Francisco on September 24, 2000 by the USCG after port State inspections revealed safety deficiencies. The four safety deficiencies cited were two inoperative main fire pumps, a leaking starboard boiler oil settling tank, inoperative main vent blowers for the engine room, and leaking fuel oil lines to the main diesel engine. The vessel was allowed to proceed to a terminal and offload its cargo of crude oil in early October after repairs were made.

### 3.1.3 Impacts Analysis and Mitigation Measures

#### Significance Criteria

A public safety impact is considered significant if any of the following apply:

- There is a potential for fires, explosions, releases of flammable or toxic materials, or other accidents from the terminal or from vessels calling at the terminal that could cause injury or death to members of the public or

- The existing facility does not conform to its oil spill contingency plans or other plans that are in effect; if current or future operation may not be consistent with federal, state, or local regulations. Conformance with regulations does not necessarily mean that there are not significant impacts.

- Existing and proposed emergency response capabilities are not adequate to effectively mitigate spills and other accident conditions.

The potential for oil or product spills is discussed in this section; however, the potential impact from spills is analyzed in the other resource-related sections (e.g., marine biology, water quality, fisheries, land and recreation uses).

#### Approach to Analyzing Impacts of Upset Conditions

System safety/risk-of-upset impact significance criteria are more difficult to define than those of other environmental issue areas because an accident must occur before an impact can occur. The expected frequency of accidents must be factored into the definition, and to complicate the matter, just because an accident occurs does not mean significant impacts will result. Thus, system safety/risk-of-upset considers both (1) spills that can potentially impact the environment, and (2) incidents that can potentially impact the safety of the public.

The expected frequency of spills occurring as a function of volume was estimated, as was the extent of area that may be impacted by these spills using available oil spill trajectory modeling results. Appendix B contains copies of applicable spill trajectory modeling results from the Unocal EIR, Shore Terminal Oil Spill Contingency Plan, and Clean Bay Regional Response Manual. Note that a spill itself does not necessarily impact the environment unless specific resources are impacted. How a spill impacts the environment is addressed in the other resources sections of this EIR, including Biological Resources (Section 3.3), Fisheries (Section 3.4), Land Use/Recreation (Section 3.5), and Visual Resources (Section 3.9). Any deficiency in Shore's ability to respond to upset conditions and the potential for impacts to public safety is assessed.

For incidents that may impact public safety, the expected frequency versus severity of consequences matrix (Figure 3.1-4) was used to determine the level of significance. This concept classifies expected frequency of occurrence into five categories (frequent, likely, unlikely, rare, and extraordinary) based on a predefined expected level of occurrence. Severity of consequence is also classified into five categories (negligible, minor, major, severe, and disastrous) based on the potential safety impact on the public. Potential impacts to the public have been determined by calculating applicable "hazard footprints" for the type of accidents that can potentially occur. Types of hazard footprints that have been calculated include radiant heat from a fire, flammable gas cloud from a release, and blast overpressure and flying debris from an explosion. Figure 3.1-4 presents the significance criteria matrix for hazard footprints. Incidents that fall in the shaded area of the matrix would be classified as significant.

The analysis of the Proposed Project quantifies the probability of an accident due to the project from both the tank vessel traffic and the terminal. The analysis considers the specific type (e.g., tankers, barges) and number of vessels that will be calling at the terminal over the lease period, specific design features of the terminal, and the historical accident record. Information regarding potential hazards during vessel approaches and departures is evaluated based on historical data, interviews with people knowledgeable of the area, and information that may be available from the Harbor Safety Committee. Particular attention has been given to the approach through the Carquinez Strait and the Benicia-Martinez Bridge complex.

Terminal design is analyzed in Section 3.11, Geotechnical Resources/Structural Integrity Review, based on information provided by Shore Terminals and the CSLC Marine Facilities Division (inspections performed). This risk/safety analysis has been performed to help determine what types of incidents can occur at the terminal, the consequences of the incidents, and their expected frequency of occurrence. All aspects of the terminal and terminal operations have been addressed, including the loading hoses/ arms, the pipelines between the wharf and the refinery/storage tanks, the vapor collection system, the wharf drainage system, and the wharf itself. Seismic stresses are also addressed. The worst case and most likely spill sizes that could occur from the various components of the terminal have been estimated. Some of this information, including a worst-case spill and risk and hazard analysis, is provided in the Shore Terminals' Oil Spill Response Plan approved by the OSPR. Shore Terminals' ability to respond and mitigate potential incidents has also been evaluated.

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| | | SEVERITY OF CONSEQUENCE | | | | |
|---|---|---|---|---|---|---|
| | | Negligible: No Significant risk to the public, with no minor injuries | Minor: Small level of public risk, with at most a few minor injuries | Major: Major level of public risk with up to 10 severe injuries | Severe: Severe public risk with up to 100 severe injuries or up to 10 fatalities | Disastrous: Disastrous public risk involving more than 100 severe injuries or more than 10 fatalities |
| FREQUENCY OF OCCURENCE | Frequent: Greater than once a year | | | | | |
| | Likely: Between once a year and once in one hundred years | | | | | |
| | Unlikely: Between once in a hundred and once in ten thousand years | | | | | |
| | Rare: Between once in ten thousand years and once in a million years | | | | | |
| | Extraordinary: Less than once in a million years | | | | | |

Defined as significant impacts

Source: County of Santa Barbara Department of Resource Management, Environmental Thresholds & Guidelines Manual, Amended 1995.

Chambers Group

**SEVERITY OF CONSEQUENCES MATRIX**
**Figure 3.1-4**

#### 3.1.3.1 Spill Response Capability and Potential for Public Risk at the Shore Marine Terminal

Response capability at the Shore marine terminal is based on spill rate, spill planning volumes, probability of release, and the other factors described below, followed by the impact analyses.

Spill Rate

During the period covered by CSLC spill records (1992 through 2001), there were a total of 128 releases from the marine terminals operating in the Bay Area. This equates to approximately 1 release to every 219 vessel calls. This spill rate is based on the assumption that the annual number of tank vessel calls to marine terminals in the Bay Area from 1992 through 2001 has remained about the same, approximately 2,800 tank vessel calls per year. This number is based on data contained in Appendix C of the Unocal San Francisco Refinery Marine Terminal EIR (Chambers Group 1994) which show 2,871 tank vessel calls in 1992, and the CSLC data, which show 2,738 tank vessel calls in 1998 and 2,742 tank vessel calls in 2001.

As discussed in Section 3.1.2.7, there has only been one spill from the Shore terminal during the past 5 years. During the 5-year time period between 1970 and 2001, there were 879 vessel calls with transfers. Although this database is small, the spill frequency of 1 spill to every 879 vessel calls is below the Bay Area average as above.

Spill Planning Volumes

EPA, USCG, and CSLC have specified methods for calculating three levels of spill planning volumes for use in determining the minimum amount of spill response equipment/capability that must be available within specified times frames to respond to the release. These are discussed below.

Reasonable Worst Case Discharge (WCD)

The Reasonable WCD planning volume is defined by California Regulations as the portion of the line fill capacity which could be lost during a spill, taking into account the availability and location of the emergency shut-off controls, plus the amount which may be "reasonably expected" to be released during emergency shut-off of the transfer if a hose ruptures. Shore calculated WCD Planning Volumes for the four groups of oil that they handle at the terminal. These volumes are presented in Table 3.1-7. The Shore terminal does not handle Group V oils (i.e., oils with a specific gravity greater than 1.0).

**Table 3.1-7**
**Shore Martinez Terminal Worst-Case Discharge (WCD) Planning Volumes**

| Oil Group | WCD Planning Volume (bbl) |
|---|---|
| I – Nonpersistent Oils (e.g., gasoline, diesel, methanol) | 1,002 |
| II – Persistent oils with a specific gravity less than 0.85 | 1,002 |
| III – Persistent oils with a specific gravity between 0.85 to 0.95 (e.g., neutral lube oils, crude oil, cutter stock) | 5,830 |
| IV – Persistent oils with a specific gravity between 0.95 and 1.0 (e.g., bunker fuel oil, cutter stock) | 5,830 |

The WCD volumes were based on drain down of all the pipelines containing that particular group of oil, including the amount that could be pumped out of the pipelines during the time it takes to detect the release (assumed to be 5 minutes), plus the time it takes to shut down the pumps (assumed to be 1 minute).

Maximum Most Probable (Medium) Discharge

USCG defines this discharge as the lesser of 1,200 bbls or 10 percent of the volume of the WCD. The WCD is 5,830 bbls and thus, the maximum most probable discharge is 583 bbl.

Average Most Probable (Small) Discharge

EPA defines the average most probable discharge as 50 bbls, not to exceed the WCD while the USCG defines it to be the lesser of 50 bbls or 1 percent of the WCD (58 bbls in this case). Thus, the average most probable (small) discharge planning volume is 50 bbls.

Probability of Release

Probability of Spills from the Marine Terminal

CSLC spill data, augmented by additional data for larger spills, were used to estimate the probability of spills from the Shore Martinez terminal. The average number of vessel calls in the Bay over the past 10 years has been 2,800 per year; this results in a probability of a spill per vessel call of 4.6 x $10^{-3}$. The largest spill from a terminal or vessel at the terminal during the 10-year period was 26 bbls (1,092 gallons). While the probability of a spill is presented in terms of spills per vessel transfer, the database includes spills that occur even when a vessel is not present. However, the vast majority of spills occur when vessels are present and it is generally felt that including other spills in the calculations does not bias the results. Therefore, the probability actually reflects the probability of spills at the Shore terminal during normal operations and not just those associated with transfer operations.

To estimate the probability of a spill greater than 26 bbls, worldwide data were used. Based on the review of the various components of the Shore terminal discussed above, it is believed that spill statistics for marine terminals worldwide can be used to estimate the potential for a large spill from the Shore terminal.

Aspen Environmental Group (1992) estimated that the “at-pier” spill rate for spills greater than 1,000 bbls is 0.95 spills per 10,000 port calls for tankers worldwide. Because of the safety record of the San Francisco Bay Area, Aspen applied a 0.4 historical modifier to the worldwide spill rate, resulting in a spill rate estimate of 0.38 spills per 10,000 port calls (3.8 x $10^{-5}$ spills per port call greater than 1,000 bbls). The spill rate for tankers involved in Alaskan crude trade is 0.44 spills per 10,000 port calls greater than 1,000 bbls, similar to the modified Bay Area estimate.

To estimate the probability spills greater than 10,000 gallons (238 bbls), information on spills occurring between 1978 and 1988, published by Cutter Information Corporation (1989), was analyzed. Based on this database, the probability of spills greater than 238 bbls at marine terminals in the Bay Area is estimated to be 2.7 x $10^{-4}$ per port call. The database also shows that the spill rates are essentially the same for tankers and tank barges. The spill rates for spills greater than 238 bbls and 1,000 gallons discussed here were also used in the Unocal San Francisco Refinery Marine Terminal EIR (Chambers Group 1994).

The CSLC and Cutter databases were used to develop a spill size distribution for the Shore Martinez terminal. Figure 3.1-5 presents the curve for the cumulative spill size distribution. Because the majority of spills are small, a logarithmic scale was used for the spill size axis. As can be seen in the figure, 54 percent of all spills are less than 1 gallon, 70 percent less than 10 gallons, 86 percent less than 100 gallons, and 95 percent less than 1,000 gallons.

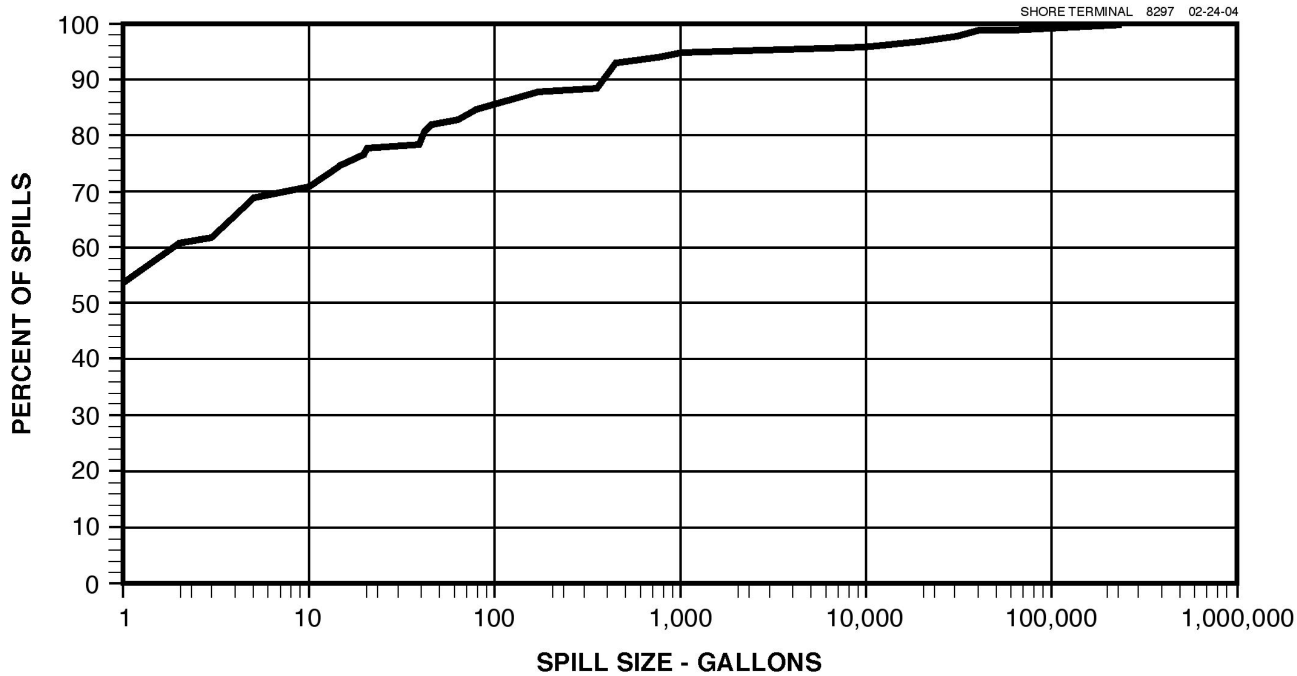
Spill Expectancy Based on Existing Vessel Calls

As shown in Section 2.2.5, Table 2.2-3, the average number of vessel calls to the Shore terminal from 1998 through 2002 was 178. According to Shore, the marine terminal has the potential to handle up to 325 vessel calls per year over the 20-year proposed lease period based on maximum upland expansion capacity. Hence, estimated spill frequencies have been calculated based on the baseline average (178 vessel calls per year), and on the maximum number that the terminal can handle with expansion (325 vessel calls per year).

Based on the baseline average, an average of about 1 spill every 1.8 years can be expected from the Shore terminal. The annual probability of a spill would be approximately 56 percent. As stated above, the spill would be expected to be less than 1 gallon 54 percent of the time and less than 10 gallons 70 percent of the time. The probability of a spill larger than 1,000 gallons from the terminal would be 4 percent or 1 spill every 25 years. During the past 10 years, only 1 spill greater than 1,000 gallons from any marine terminal in the Bay Area has occurred. The annual probability of a spill greater than 42,000 gallons (1,000 bbls) from the Shore terminal, including a tank vessel at berth, is 0.7 percent. This equates to an expected mean time between spills of 150 years. Over a 20-year lease, there would be a 13 percent probability that one or more spills greater than 42,000 gallons (1,000 bbls) would occur. [The probability of a spill greater than 42,000 gallons in 20 years is determined by calculating the probability of no spills in 20 years which is equal to the probability of no spills in a single year (1-0.007 = 0.993) raised to the twentieth power ($0.993^{20} = 0.869$) and then subtracting this from 1 (1 – 0.869 = 0.13).] The probability of a spill (one or more) in a given time period is equal to 1 minus the probability of no spills in that time period.

*Spill Expectancy Based on Maximum Vessel Calls over Lease Period*

Based on the maximum number of annual vessel calls that the terminal can handle (325), an average of about one spill every 1.3 years can be expected. The annual probability of a spill would be approximately 78 percent. The probability of a spill of 1,000 bbl or more over the 20 year lease period would be 21 percent. Table 3.1-8 summarizes the spill probabilities based on both the baseline average and future maximum number of vessel calls.




**Source:** California State Lands Commission and Cutter Databases

Chambers Group

**CUMULATIVE SPILL SIZE DISTRIBUTION**
**Figure 3.1-5**

**Table 3.1-8**
**Annual Probability of Spills from the Terminal**

| Annual Number of Vessel Calls | Baseline Average<br>178 Vessel Calls | Maximum over Lease Period<br>325 Vessel Calls |
|---|---|---|
| Annual probability of a spill of any size | 0.56<br>once every 1.8 years | 0.78<br>once every 1.3 years |
| Annual probability of a spill > 1 gal | 0.32<br>once every 3.2 years | 0.50<br>once every 2.0 years |
| Annual probability of a spill > 10 gal | 0.22<br>once every 4.6 years | 0.36<br>once every 2.8 years |
| Annual probability of a spill > 100 gal | 0.11<br>once every 9 years | 0.19<br>once every 5.3 years |
| Annual probability of a spill > 1,000 gal | 0.04<br>once every 25 years | 0.07<br>once every 14 years |
| Annual probability of a spill > 42,000 gal (1,000 bbl) | 0.007<br>once every 150 years | 0.012<br>once every 80 years |

The consequences of a spill would depend on the size of the spill, the effectiveness of the response effort, and the biological, commercial fishery, shoreline, and other resources affected by the spill. The effectiveness of Shore spill response is discussed below.

Shore Marine Terminal Spill Response Capability

Shore maintains the following oil spill response equipment at the terminal:

- 700 feet of 20-inch containment boom on the east end of the dock
- 700 feet of 20-inch containment boom on the west end of the dock
- One 1,954 bbl per day on-water skimmer on the eastern side of the dock (owned by NRC)
- Two boxes of absorbent pads/booms

As stated in Section 3.1.2.6, Shore Terminals contracts with NRC for spill response services, and lists them in their Oil Spill Response Plan as their OSRO for onwater, onshore, and shallow water response. Whenever a tanker transfers product at the terminal, a standby boat with a crew capable of deploying the boom is present. Shore has demonstrated that 600 feet of boom can be deployed within 30 minutes to meet CSLC requirements, and that the means to deploy 1,000 feet of boom can be on scene within 1 hour to meet USCG requirements. Because the terminal is designated a high velocity current terminal, predeployment of boom is not required nor done.

The oil spill response resources of NRC and other response contractors are summarized in Section 3.1.4.7. The Shore Terminals Oil Spill Response Plan, Appendix C, lists the NRC Western Region response equipment.

Shore's response strategies and capabilities for responding to various materials and release sizes, and identified impacts are presented below.

**Impact OS-1: Wharf Deck Drainage System**

**There are no deficiencies with the existing deck drainage system or procedures that would pose a risk for, or increase the potential for spills at the terminal from routine operations. Impacts are less than significant (Class III).**

A 6-inch high curb surrounds the wharf deck and the drains that connect to a 25-bbl capacity sump. All drips and discharges on the wharf are flushed into this drain system, which operates by a level control switch to avoid overflows. Section 2.2.2 describes the drip and recovered oil facilities. The Emergency Shutdown (ESD) system is described in Section 2.2.3 with activation of the ESD system able to close the pipeline block valves within 60 seconds. Based on analysis of the Wharf Operations Manual and on the Chambers Group 2002 site visit, no significant deficiencies with the existing transfer equipment or procedures would pose a risk for, or increase the potential for spills at the terminal. Thus, impacts from routine operations are considered less than significant (Class III).

OS-1: No mitigation is required.

**Impact OS-2: Potential Impacts from Gasoline Releases**

**Potential impacts to public safety from a gasoline release are less than significant (Class III).**

Gasoline is highly flammable and evaporates rather quickly. Because it is so volatile and easily ignited, Shore states in their Oil Spill Response Plan that, to avoid ignition, boom should not be deployed in the vicinity of a gasoline spill. The standard response to a gasoline spill is to stop the source of the spill, keep vessel and other marine traffic away from the pool to prevent ignition, and wait until the gasoline evaporates until there is no ignition hazard. As gasoline is lighter than water and will float, the spill and vapors may travel some distance from the pool. The vapors can result in a flammable vapor cloud, but would disperse quickly. This response method is accepted and no additional response is required. The potential for impacts to water quality and biological resources are discussed in Sections 3.2 and 3.3, respectively.

<u>OS-2: No mitigation is required.</u>

**Impact OS-3: Response Capability for Containment of Spills from Terminal during Transfer Operations.**

**Shore's response capability for containment of spills during transfer operations would be adverse and significant for spills greater than 50 bbls, and range from spills that can be contained during first response efforts with rapid cleanup (Class II), to those complex spills that result in a significant impact (Class I) with residual effects after mitigation.**

The Shore terminal meets all federal and state requirements for response capabilities. Shore and their response contractors are expected to be able to prevent a small spill of less than 10 gallons from causing significant impacts. In most cases, Shore's response capability is considered adequate to contain a spill of up to 50 bbl and prevent it from spreading over a wide area. However, it may not be possible to contain and recover all of the oil. The terminal, moreover, will not be able to contain and recover all the oil from a release of greater than 50 bbl. Impacts to resources (discussed in other sections of this EIR), conclude that spill impacts would be adverse and significant. Preventative actions can be taken to minimize these impacts.

The first action in the event of a release is to stop the release if it can be done safely. Loading operations can be shutdown using an ESD switch that stops the shore pumps pumping oil to the vessel. There are tight seal shut off valves located on the wharf to close off the three 12-inch lines and the 30-inch line connected to the shore pumps and tankage. There are also tight seal shut off valves on the wharf for the two 16-inch loading arms. Isolation valves are located on the shore at the start of the trestle for all transfer lines. The wharf control room can engage these isolation valves remotely, and can shutoff 100 percent within 60 seconds.

Check valves on the wharf would stop flow of oil from the shore facility into the water if the ship breaks loose from the loading arm while pumping oil ashore. In accordance with written procedures, the positions of the check valves are checked by the operator both prior to and following each transfer. When pumping oil from shore to a vessel, the check valves are held open by a lever arm, which can be quickly released if a loading arm breaks loose. The TPIC and VPIC are in continuous communication and in the event of a release during transfer from the ship, the VPIC can be notified to immediately cease pumping operations.

During transfer operations, a boom deployment boat is positioned near the terminal. In the event of a release, it will immediately deploy boom, either from the boat or the wharf, down current from the spill. Six hundred feet of boom can be deployed within 30 minutes. Depending on the size of the spill, additional response resources will be called in. NRC is currently Shore's primary response contractor. NRC maintains three boats, a 30-foot response boat, a 22-foot whaler, and a 15-foot skiff all located at the Martinez Marina, approximately 2 miles from Shore. These vessels can be at the Shore terminal within 2 hours. Locally available containment boom includes 1,400 feet of 20-inch boom located on the Shore wharf, 2,500 feet of NRC-owned 21-inch boom located at the Shore terminal, and 1,200 feet of NRC-owned boom located on the NRC barge in the Martinez Marina that is deployable within 1 to 3 hours. NRC maintains a 1,954 bpd skimmer on the Shore wharf that can be deployed within 1 hour. In addition, NRC maintains a 4,114 bpd skimmer at the Martinez Marina that can be brought to the Shore terminal within 2 hours. NRC can also bring 538 bbls of storage containment, a 238 bbl portable barge, and three 100 bbl bladders to the terminal within 2 hours.

If additional resources are needed, NRC can provide three additional skimmers with a total recovery rate of 14,125 bpd and 32,059 bbl of additional storage onsite within 6 hours. Within 30 hours, NRC can supply a total of 30,561 bpd of skimming capability and over 1 million bbls of temporary storage onsite.

In its Oil Spill Response Plan (Shore Terminals LLC 2001), Shore has identified sensitive resources that may be impacted during the initial 24 hours of a release for both the winter and summer seasons, based on the results of oil spill trajectory modeling. Shore also estimated the time the release would take to reach the resource. Resources potentially impacted within 3 hours include Suisun Shoal, Hastings Slough, Point Edith, Seal Island, Bulls Head Marsh, Pacheco Creek, Martinez Marsh, Shell Dock Marsh, and Benicia Marsh. The list is in table format and includes a column for assignment of responsible people to ensure that the area is protected and within the designated time frames. The Oil Spill Response Plan states that the strategies to be used to protect the sites are presented in the Area Contingency Plan for the San Francisco Bay Area. Shore's and NRC's compliance with measures contained in the Area Contingency Plan serve to help protect these resources. Further discussion on protecting sensitive resources is provided in Section 3.3, Biological Resources of this EIR.

<u>Mitigation Measures for OS-3:</u> The following shall be completed by Shore Terminals within 12 months of lease implementation, unless otherwise specified.

**OS-3a**: Provide quick release devices that would allow a vessel to leave the wharf as quickly as possible in the event of an emergency (fire or accident that could lead to a spill), that could impact the wharf or the vessel.

**OS-3b:** Install tension monitoring devices on the wharf that would avoid excess strain on mooring lines and avoid damage that could result in spills.

**OS-3c:** Install Allision Avoidance System (AAS) at the terminal to prevent damage to the pier and/or vessel during docking operations.

**OS-3d:** Develop a comprehensive preventative maintenance program for the wharf, that includes periodic inspection of all components related to transfer operations. The program shall be subject to review and approval by the CSLC.

Rationale for Mitigation: The above measures would either lower the probability of an oil spill or increase response capability for spills smaller than 50 bbls, thus helping to reduce spills and their associated impacts. Class II impacts can be reduced to less than significant.

Residual Impacts: The impacts associated with the consequences of larger spills, greater than 50 bbls, could remain significant (Class I).

**Impact OS-4: Terminal Spills from Pipelines during Non-Transfer Periods.**

**Spills from the terminal during non-transfer periods would be associated with pipelines and are considered a significant (Class II) impact if spills are less than 50 bbls, or significant (Class I) impacts for spills greater than 50 bbls.**

The only potential source for a spill during period of no transfers would be associated with the pipelines. Pipeline integrity is discussed in Section 3.11.3, Geological Resources/Structural Integrity Review, and impacts to resources are discussed in Sections 3.2.3, Water Quality and 3.3.3, Biological Resources. Pipeline integrity is determined to be a (Class II) significant impact.

When transfers are not occurring, the standby boom deployment boat is not present. The regulations do not require the deployment of boom within 30 minutes during non-transfer times as the probability of a release is much less. The response to a non-transfer release would be similar as described above, except that it could take up to 2 hours to bring a response vessel to the site to begin deploying boom because the standby boom deployment boat may not be present. After that, the total amount of response equipment that could be brought to the scene would be the same as when a tank vessel is transferring oil. Shore and their response contractors are expected to be able to prevent a small spill of less than 10 gallons from causing significant impacts. In most cases, the response capability is considered adequate to contain a spill of 50 bbl or less, and prevent it from spreading over a wide area, resulting in a (Class II) impact. However, it may not be possible to contain and recover all of the oil, and impacts of spills would be adverse and significant impacts (Class I).

Mitigation Measures for OS-4:

**OS-4:** Implement measure OS-3d.

Rationale for Mitigation: The measure OS-3d would help to lower the probability of an oil spill or increase response capability, thus helping to reduce spills and their associated impacts. Additional analysis and mitigation for pipeline integrity due to seismic forces, measures GEO-11a and GEO-11b are presented in Section 3.11.3.

Residual Impacts: The impacts associated with the consequences of larger spills could remain significant (Class I).

**Impact OS-5: Contingency Plans.**

**Shore Terminals Wharf Operations Manual requires minor revisions to become current, and is a significant (Class II) impact.**

Shore Terminals maintains an Oil Spill Response Plan that strictly addresses response to spills and was updated in July 2003 with USCG approval dated November 2003. The Plan references the OSPR Area Contingency Plan for specific procedures for protecting sensitive resources. The Plan is complete and up-to-date.

Shore Terminals also maintains a Wharf Operations Manual which was last approved by the CSLC in 1999. The Wharf Operations Manual addresses wharf operations, including responses to emergency situations such as spills and fires. The Manual requires minor revisions to bring it current, including updating names of responsible persons at the terminal and the names of the response contractors. This is important information for terminal operations staff in the event of an emergency, thus updating is required. In order to assure that this action will occur under the new lease, it has been identified as a significant impact (Class II).

Mitigation Measure for OS-5:

**OS-5:** Shore Terminals shall update and bring the Wharf Operations Manual current. Revise the manual by providing current names of responsible persons at the terminal and the names of the current response contractors. Submit the Manual to the CSLC for review and approval within 6 months of lease implementation.

Rationale for Mitigation: Updating the manual will allow personnel to have the most current information available to be assured that the appropriate parties can be contacted to respond to emergency situations. Impacts would be reduced to less than significant.

**Impact OS-6: Potential for Fires and Explosions and Response Capability**

**Public areas are beyond the hazard footprint boundary, thus fires and explosions would not cause a public safety risk. However, the Wharf's Operations Manual does not address fire emergency procedures and the Wharf does not meet detection/suppression system requirements. A significant adverse (Class II) impact has been identified.**

Risk Potential and Safety Features

Although there have been no reported fires or explosions at the Shore marine terminal during the past 10 years, fires and explosions are possible at the terminal involving vessels and/or the terminal itself. Aspen Environmental Group (1992), based on the MMS Tanker Spill Database, showed that 21.6 percent of spills greater than 1,000 bbls at a pier were due to fires or explosions. Chambers Group (1994) estimated that the probability of a fire or explosion per vessel call at the Unocal (now ConocoPhilips) Rodeo marine terminal is $1 \times 10^{-6}$. Based on the safety features at the Shore terminal, this estimate appears to be appropriate for vessel loading operations at the terminal. This estimate calculates an expected mean time between fires or explosions at the Shore terminal of 4,100 years. As per Figure 3.1-4, this frequency is considered unlikely to occur.

Shore has instituted several measures to minimize the potential for fires and explosions. First, vessels loading or unloading low-flash cargoes (cargoes having a flash point of less than 150ºF) are required to have properly operating inert gas systems (IGS). An IGS generates an inert gas that is injected into the cargo tanks to displace the oxygen to a level that will not support ignition. The VPIC is required to verify that the tanks are inerted and that the IGS is working properly before transfer operations can commence. Products with flash points greater than 150ºF do not generate enough vapors to support ignition unless the product is heated to a temperature above 150ºF.

A second potential area for a fire or explosion is the VCS. The VCS is equipped with numerous safety features. The VCS is described in detail in the Wharf Operations Manual (Shore Terminals 1998). A "Hazard and Operability Study" (HAZOP) of the system was conducted in 1991. As a result of the HAZOP, several design changes were made to the system and the system was certified by the USCG.

Hazard Footprint Area Generated by Radiant Heat or Explosion

A fire could result in the generation of radiant heat and an explosion could create flying debris and blast overpressure, both of which could have an impact on members of the public. The Ports of Los Angeles (POLA) and Long Beach (POLB) have Risk Management Plans (POLB 1981; POLA 1983) as addenda to their Port Master Plans, which specify the methodology to be used for calculating "hazard footprints" from marine terminals and tank vessels. These Risk Management Plans do not require hazard footprints to be calculated for vessels equipped with IGSs because the risk of fire and explosion is so small. Nevertheless, this methodology has been used here to calculate the "hazard footprint" or area at risk from fires and explosions. The radiant heat footprint capable of causing second-degree burns to exposed skin after 30 seconds of exposure (1,600 British thermal units [BTU] per square-foot per hour) was calculated to be 300 feet around the ships. An explosion involving one of the tanks could send flying debris up to 1,500 feet from the ship.

Neither the radiant heat nor the flying debris hazard footprint is expected to pose a significant hazard to the public because there are no areas of public assemblage within 1,500 feet of the wharf area, and the pier is 1,700 feet long. The radiant heat and flying debris hazard footprints would overlap areas where public boating could take place; however, high density traffic is not expected in these areas. Thus, the potential to result in a public safety impact from fires and explosions is considered less than significant (Class III). The nearest onshore public area is the BCDC trail easement that crosses the trestle at over 2,000 feet from the wharf, and the Benicia-Martinez bridge complex is a little over 1 mile from the terminal. Neither the trail nor the bridge would be impacted by a fire or explosion at the terminal.

Potential for Toxic Gas Cloud

The Shore marine terminal does not transfer any products that would produce toxic gas cloud hazard footprints that would cause health and safety risks to the public, thus impacts associated with toxic gases are less than significant (Class III).

Fire Response Capability

The wharf is equipped with fire extinguishing equipment that can be activated in the event of a fire. Four permanently mounted fire monitors are installed on the wharf. These fire monitors are fed with bay water by a 2,000 gpm diesel engine-driven pump. The three monitors located around the loading arm area are pointed at locations high on the loading arm supports so that starting the fire pump will immediately spray cooling water on the loading arms. This fire extinguishing system is started by pushing one of the red buttons. One portable 150 lb. wheeled extinguisher and three portable 20 lb. extinguishers are also located on the wharf. There are no fire response vessels located near the terminal. At the present time, it does not appear that the wharf fire detection/suppression system meets the full requirements of the proposed MOTEMS, and a significant adverse impact (Class II) is identified.

The first line of defense for a fire onboard a tanker or tank barge is the onboard fire protection systems. Tankers are required by 46 CFR 34 to have sophisticated firefighting systems which include fire pumps, piping, hydrants, and foam systems. Tank barges are required to have only portable fire extinguishers, while some are equipped with built-in systems. The tank vessel crews are trained in the use of the firefighting equipment. The onboard firefighting equipment is sufficient to extinguish most fires.

The USCG has prepared and issued a Marine Fire Fighting Contingency Plan (USCG 2000). The plan addresses risk assessment including damage potential, strategic planning, management of response efforts, and response resources available. This addresses what the USCG provides to manage and coordinate resources in the event of a tanker fire.

No discussion or procedure for dealing with tank vessel fires could be found in Shore's manuals addressing fires or emergency response. This has been identified as a deficiency in the manual and in planning for emergency response and is considered a significant impact (Class II). Related to fire emergency procedures would be an upset condition that could result in an oil spill and result in a significant impact (Class I or II) to the environment.

<u>Mitigation Measures for OS-6</u>:

**OS-6a**: Shore shall implement mitigation measure OS-3a to provide for quick release devices that would allow a vessel to depart the wharf quickly would help in the event of a fire.

**OS-6b:** Shore Terminals shall develop a set of procedures for dealing with tank vessel fires and explosions for tankers berthed at the Shore terminal. The procedures should include the steps to follow in the event of a tank vessel fire and describe how Shore and the vessel will coordinate activities. The procedures shall also identify other capabilities that can be procured if necessary in the event of a major incident. The procedures shall be submitted to CSLC within 6 months of lease renewal. CSLC shall have final approval of the plan.

**OS-6c:** Shore Terminals shall ensure that the fire detection/suppression system conforms to the proposed MOTEMS, Section 8.0.

<u>Rationale for Mitigation</u>: The mitigation measures help to either reduce the probability of a fire or increase the response capability. Implementation of these measures can reduce impacts to less than significant.

**Impact OS-7: Site Security**

**The site is secure from public access and impacts associated with site security are considered less than significant (Class III).**

The facility is surrounded by a chain-link fence that complies with federal and State requirements and is manned 24 hours per day. Electronic gates are provided at the entrance to the terminal. Visual surveillance of the wharf is conducted 24 hours per day by camera. The video from the camera is monitored in both the main office and Operations Center. Security patrols are conducted on a random schedule during each shift. There is no separate security force at the terminal. Overhead and pole mounted lighting covers most of the facility.

As stated in Section 3.1.2.3, Shore developed a comprehensive Security Plan which was approved by the CSLC on July 30, 2003. The wharf was inspected by the CSLC and USCG in December 2003 and no major discrepancies were found. In response to new federal requirements, Shore Terminals has just recently updated their Security Plan. The updated Plan has been submitted to the CSLC and USCG for review and will replace the existing Plan when approved.

<u>OS-7: No mitigation is required.</u>

### 3.1.3.2 Potential for Tanker Accidents and Safety Risk Within the Bay and Outer Coast

**Impact OS-8: Response Capability for Accidents in Bay and Outer Coast.**

**Spills from accidents in the Bay could result in impacts to water quality or biological resources that could be significant adverse (Class II) impacts for those that can be contained during first response efforts; or significant adverse (Class I) impacts that would have residual impacts. While Shore does not have legal responsibility for tankers, it does have responsibility to participate in improving general response capabilities.**

<u>Probability of Bay Vessel Traffic Accidents</u>

The probability estimates for tanker and barge spills from vessel traffic accidents are based primarily on data contained in the Unocal San Francisco Refinery Marine Terminal EIR (Chambers Group 1994), GTC EIR (Aspen Environmental Group 1992), and the Port Needs Study (USCG 1991). Table 3.1-9 presents the spill probabilities from three causes; (1) collisions which are impacts between two or more moving vessels, (2) rammings which are moving vessels running into stationary objects, and (3) groundings for both tankers and barges. These probabilities were calculated from the individual probabilities of small, medium, and large vessels, considering the volume of traffic in each category (derived from data in USCG 1991). In accordance with the methodology in Aspen, a 0.1 reduction factor has been applied to tanker and barge groundings for double-bottom and double-hull vessels, and a 0.71 reduction factor has been applied to tanker and barge collisions for double-hull vessels. The estimated probabilities of spills from the various types of tankers and barges, after applying the reduction factors, are presented in Table 3.1-10.

**Table 3.1-9**
**Spill Probabilities by Cause for Tankers and Barges Per Vessel Calling**

| Vessel Type | Probability of Spill > 100 Gallons per Vessel | | | |
|---|---|---|---|---|
| | Collision | Ramming | Grounding | Total |
| Tanker | $9.12 \times 10^{-7}$ | $1.42 \times 10^{-7}$ | $5.58 \times 10^{-7}$ | $1.61 \times 10^{-6}$ |
| Barge | $4.86 \times 10^{-6}$ | $1.50 \times 10^{-6}$ | $6.02 \times 10^{-7}$ | $6.96 \times 10^{-6}$ |
| **Source: Derived from data contained in USCG 1991.** | | | | |

**Table 3.1-10**
**Spill Probabilities Per Vessel Type Per Vessel Calling**

| Vessel Type | Probability of Spill > 100 Gallons per Vessel | | |
|---|---|---|---|
| | Single Hull | Double Bottom | Double Hull |
| Tanker | $1.6 \times 10^{-6}$ | $1.1 \times 10^{-6}$ | $8.4 \times 10^{-7}$ |
| Barge | $7.0 \times 10^{-6}$ | N/A | $5.0 \times 10^{-6}$ |

At present, approximately one-half the tankers calling at terminals inside the Bay are double hull, one-quarter are double bottom, and one-quarter are single hull. Assumptions for these estimates that 10 percent of the barges are double hulled, while the remaining 90 percent are single hulled, have been used in calculations for the current and future time frame and estimates of the probabilities of a release from these vessels while transiting the San Francisco Bay. This rate may overestimate the probability of spills because the percentage of double-hull vessels is increasing over time because of federal regulations. Based on historical data, it has been assumed that half of the vessel calls to the Shore marine terminal are tankers and the other barges. Tables 3.1-11 and 3.1-12 present the probabilities of tank releases in the Bay involving those tankers calling at the Shore terminal. Table 3.1-11 is based on the baseline of 178 annual vessel calls, the average number of vessel calls from 1998 through 2002, while Table 3.1-12 is based on 325 vessel calls, the maximum that can be handled by the terminal. Based on historical data at the terminal, it is assumed that, for both cases, 56 percent of the vessel calls would be tankers and 44 percent tank barges.

The overall probability of a release equates to approximately one spill every 1,500 years based on the average number of vessel calls the terminal has handled since 1998, and one spill every 800 years based on the maximum possible number of vessel calls. In accordance with Figure 3.1-4, these frequencies are both classified as “unlikely.”

**Table 3.1-11**
**Annual Probabilities of Spills from Vessels Calling at the Shore Terminal While Transiting the San Francisco Bay**
**(Based on 178 Vessel Calls Per Year)**

| Vessel Type | | Annual Probability of Spills > 100 Gallons | | | |
|---|---|---|---|---|---|
| | | Single Hull | Double Bottom | Double Hull | All |
| Tankers | Number of Vessel Callings | 25 | 25 | 50 | 100 |
| | Annual prob. of release | $4.0 \times 10^{-5}$ | $2.8 \times 10^{-5}$ | $4.2 \times 10^{-5}$ | $1.1 \times 10^{-4}$ |
| Barges | Number of Barge Callings | 70 | 0 | 8 | 78 |
| | Annual prob. of release | $4.9 \times 10^{-4}$ | --- | $4.0 \times 10^{-5}$ | $5.3 \times 10^{-4}$ |
| Tankers and Barges | Total Number of Vessel Callings | 95 | 25 | 58 | 178 |
| | Annual prob. of release | $5.3 \times 10^{-4}$ | $2.8 \times 10^{-5}$ | $8.2 \times 10^{-5}$ | $6.4 \times 10^{-4}$ |

**Table 3.1-12**
**Annual Probabilities of Spills from Vessels Calling at the Shore Terminal While Transiting the San Francisco Bay (Based on Maximum Possible Vessel Calls over Lease Period)**

| Vessel Type | | Annual Probability of Spills > 100 Gallons | | | |
|---|---|---|---|---|---|
| | | Single Hull | Double Bottom | Double Hull | All |
| Tankers | Number of Vessel Callings | 45 | 46 | 91 | 182 |
| | Annual prob. of release | $7.2 \times 10^{-5}$ | $5.1 \times 10^{-5}$ | $7.6 \times 10^{-5}$ | $2.0 \times 10^{-4}$ |
| Barges | Number of Barge Callings | 129 | 0 | 14 | 143 |
| | Annual prob. of release | $9.0 \times 10^{-4}$ | --- | $7.0 \times 10^{-5}$ | $9.7 \times 10^{-4}$ |
| Tankers and Barges | Total Number of Vessel Callings | 174 | 46 | 105 | 325 |
| | Annual prob. of release | $9.8 \times 10^{-4}$ | $5.1 \times 10^{-5}$ | $1.5 \times 10^{-4}$ | $1.2 \times 10^{-3}$ |

Tank vessels calling at the Shore marine terminal must pass under the Benicia-Martinez Bridge complex. This bridge complex is described in Section 3.1.2.5. This bridge complex requires tankers to navigate through two bridges, the road bridge with an opening of 440 feet and the railroad bridge with an opening of 291 feet. In addition, a second road bridge is presently being constructed. A comprehensive marine operations impact study (Reese-Chambers 1991) was conducted to analyze the potential impact of the existing and expanded bridge complex on vessel traffic that must pass through the complex. The San Francisco Bar Pilots were consulted during the conduct of the analysis. The analysis concluded that the existing bridge complex does not present a safety hazard, and that the addition of another bridge would not decrease the safety of passing through the bridge complex.

The distribution of a spill size greater than 238 bbls (10,000 gallons) for tankers and tank barges, given there is a spill, was derived from Cutter Information Corporation (1989). The distributions for tankers and tank barges are similar for smaller spills; however, the probability of a larger spill is higher for tankers because they can carry more oil (Figure 3.1-5). The figure shows that the vast majority of spills is small. Unfortunately, the Cutter database does not include spills less than 238 bbls and hence, it is not possible to combine the spill distribution with the estimated probability of a spill.

<u>Spill Response for Vessels Transiting the Bay</u>

Response to a spill from a tanker is the responsibility of the vessel owner/operator. As a result of OPA 90, each vessel is required to have an oil plan that identifies the worst-case spill (defined as the entire contents of the vessel) and the assets that will be used to respond to the spill. All tanker companies operating within California waters, must demonstrate by signed contract to the USCG and CDFG that they have, either themselves or under contract, the necessary response assets to respond to a worst case release as defined under federal and state regulations. Shore does not own or operate any tank vessels and thus, is not responsible for spills from tankers once they have left the terminal. Shore would respond to spills from tankers at their terminal.

Response to a vessel spill would consist of containment (deploying booms), recovery (deploying skimmers), and protection of sensitive resources. If the oil were to reach the shore and/or foul wildlife, the shoreline and wildlife would be cleaned. If the tanker's spill response contractor is unable to adequately respond to the spill, the Coast Guard could step in and order additional response equipment and hire additional response contractors that could include both Clean Bay and MSRC. If required, additional equipment and manpower would be made available from local contractors, other spill cooperatives (Clean Seas, Clean Coastal Waters), and MSRC at other locations.

While response contractors can provide the equipment and manpower required by OPA 90 and OSPR, it is unlikely that they could prevent a large spill from causing significant contamination of the shoreline. The Area Contingency Plan identifies sensitive resources within the Bay Area and methodologies for protecting and cleaning up those areas. Consistent with the findings of the other resource disciplines in this EIR, it was concluded that, although the probability of a large spill from a tank vessel is small, the consequences of a spill could be significant (see Sections 3.2 Water Quality, 3.3 Biological Resources, 3.4 Commercial Fisheries, 3.5 Land Use/Recreation, and 3.9 Visual Resources). Based on the anticipated spills and on the impacts to resources, it is concluded that the impact of spills would be adverse and significant and range from spills that can be contained during first response efforts with rapid cleanup (Class II) to those complex spills that result in a significant impacts (Class I) with residual effects after mitigation. As discussed in Impact OS-3, Shore's response capability at the terminal is considered a Class II impact.

<u>Spill Response for Vessels Transiting the Outer Coast</u>

As above, the vessel owner/operator is responsible for cleaning up spills and must be able to identify what assets will be used. The Area Contingency Plan identifies sensitive resources along the outer coast and measures to be used in protecting these resources.

Response to spills outside the Bay would be somewhat different from that inside the Bay. First, the environment outside the Bay may be more difficult to work in because of sea conditions. Booms become less effective as wave heights increase, losing much of their effectiveness once waves exceed 6 feet. There may be conditions when it would be impossible to provide any response actions. However, when wave energy is such that it is impossible to deploy response equipment, the wave energy causes the oil to be dispersed much more rapidly.

Second, it may not be necessary to try to contain and clean up a spill if it does not threaten the shoreline or a sensitive area. In this case, the spiller would monitor the trajectory of the spill in accordance with methodologies presented in the Area Contingency Plan.

If the spill could affect the shoreline or sensitive area, then the response efforts would consist of containing and cleaning as much oil as necessary, and protecting sensitive areas.

The response contractor's large response vessels are located inside the Bay. It would take the vessels a minimum of 2 hours to get underway and exit the Bay, and 24 hours to reach the Fort Bragg area. While the contractor response capability meets the minimum requirements of OPA 90 and OSPR, a large spill could still result in significant, adverse impacts (Class I) to sensitive resources as described in other resources sections of this document.

Mitigation Measures for OS-8:

**OS-8a:** As a lease condition, Shore shall agree to participate in an analysis to determine the adequacy of the existing VTS in the Bay Area, if such a study is conducted by a federal, state, or local agency during the life of the lease. Agencies such as the San Francisco Bay Harbor Safety Committee often conduct studies of safety issues within the Bay Area. As vessel traffic increases in and around the Bay Area and as technology improves, it may be necessary and feasible to upgrade and expand the VTS in and around the Bay Area. Shore shall participate in this analysis and contribute a pro-rata share toward the upgrade and expansion of the system, if required to do so by the CSLC.

**OS-8b:** As a lease condition, Shore shall agree to respond to the spill as if it were its own, without assuming liability, until such time as the vessel's response organization can take over management of the response actions in a coordinated manner.

Rationale for Mitigation: As presented above, the tanker owner/operator has responsibility for spills from their tanker. Shore does not have any legal responsibility for tanker spills. Nevertheless, these activities that Shore can participate in that can improve response capabilities in general and help to reduce the consequences of spills by increasing response capability within the Bay. For a spill near the Shore terminal, Shore is more suited to provide immediate response to a spill using its own equipment and resources, while waiting for mobilization and arrival of the vessel's response organization. The marine terminal staff is fully trained to take immediate actions in response to spills.

Residual Impacts: Even with these measures, the consequences of a spill could result in significant, adverse impacts (Class I).

### 3.1.4 <u>Alternatives</u>

#### 3.1.4.1 No Project Alternative

**Impact OS-9: Effects on Other Area Terminals with No New Shore Terminal Lease**

**With no lease, impacts would be no potential for tanker spills at the Shore terminal, a beneficial (Class IV) impact; however, similar impacts to those for the Proposed Project would be transferred to other area terminals. Spill impacts at those terminals would be adverse and significant, and range from spills that can be contained during first response efforts with rapid cleanup (Class II) to those complex spills that result in significant impacts (Class I) with residual effects after mitigation. Shore would have no responsibility for actions at those terminals. Decommissioning of the wharf would be subject to a separate CEQA review.**

With no new lease, there would be no potential for spills from the terminal once the pipelines are purged and removed. Decommissioning of the wharf would be subject to a separate CEQA review; however, there could be a small risk of a spill during the pipeline purging and removal process that could be contained, and thus considered a significant impact (Class II). Following decommissioning, with no wharf, there would be no potential for tanker spills at the terminal nor would there be a potential for tanker fires or explosions at the terminal. The potential risk from the VCS would also be removed. Thus, with no Shore Terminals wharf there would be no potential for risk or safety impacts (Class IV).

The demand for crude oil at the nearby refineries is not expected to decrease. Hence, the crude oil would have to be imported in some other manner. This could be by tank vessel through other marine terminals or by pipeline. If the crude oil were imported through other marine terminals, the overall probability of an oil spill in the area would be expected to be approximately the same. Depending on the location of the terminals, different sensitive resources could be impacted in the event of a release. Also, depending on the location of the marine terminals that would be used, the length of the pipelines connecting the marine terminal to the refineries could be longer. This could increase the risk of a pipeline release.

The use of pipelines to import the crude oil presently going through the Shore terminal may be difficult because of where the oil comes from. To use pipelines to import the crude requires that the crude come from a location that has a pipeline that runs to the refinery. Available pipelines would require further examination for compatibility.

Besides importing crude oils, the refineries must ship out their refined products. Without the Shore terminal, the refineries would be required to ship through other marine terminals or use pipelines. As with the import of crude, the use of tank vessels at other marine terminals would shift the risk to those terminals.

This No Project Alternative would eliminate safe/risk issues as described for the Proposed Project; however, it would shift the impacts associated with spills to other facilities. While those facilities already have operating wharves, spill impacts would be adverse and significant, and range from spills that can be contained during first response efforts with rapid cleanup (Class II) to those complex spills that result in significant impacts (Class I) with residual effects after mitigation.

It is possible that shifting the import of crude oil and export of products to other marine terminals could tax the capacity of the terminals causing congestion at the terminals and/or increases in pumping rates, which in turn could increase the risk causing significant impacts (Class I or II) to occur. It has been shown that the Shore marine terminal and tank vessels at its wharf do not generate hazard footprints that present a risk to the public. This may not be true of some or all of the other marine terminals that could be used. As such, significant impacts (Class I or II) could occur. Lastly, a new lease for the Shore terminal will include many mitigation measures as conditions of the lease, which would increase the safety of the facility. Other marine terminals that could be used may not have these same mitigation measures.

The next two alternatives discuss the continued operation of the upland portion of the Shore terminal (tank farm and pipelines) without the marine terminal portion.

Mitigation Measures for OS-9:

**OS-9:** Mitigation associated with the Shore facility would not be required. However, similar mitigation, as that described for the Proposed Project (OS-3 through OS-8), would be required at other terminals. It is unknown at this time whether such measures are in place at other terminals.

Rationale for Mitigation: As with the Proposed Project, the mitigation applied to the other terminals would lower the probability of spills and increase response capabilities at the other terminals.

Residual Impacts: Impacts associated with the Shore facility would be reduced, but impacts at other terminals would increase and have the potential to remain significant (Class I).

#### 3.1.4.2 Increased Use of Existing Pipelines for Continued Operation of Upland Facility Alternative

**Impact OS-10: Continued Shore Upland Operations via Existing Pipelines**

**With no lease, impacts would be no potential for tanker spills at the Shore terminal, a beneficial (Class IV) impact; however, similar impacts would occur or be transferred to other area terminals and spill impacts would be as described in OS-9 (Class I and II). Impacts from use of existing pipelines would be significant (Class I or II) if a spill were to occur.**

Under this alternative, the potential risks of using other marine terminals would be as discussed above in OS-9 (Class I and II impacts).

The risk from the upland portion of the Shore facility would be essentially the same as it is at present. The potential for spills from pipelines is generally thought to be a function of the length of the pipeline, if operating pressures do not change. The throughput volumes would either stay the same or increase. Likewise, the potential for accidents involving the storage tanks is generally thought to be the same regardless of the throughput. Again, under this alternative, the throughput of the tanks would remain the same or decrease.

Spills from pipeline transportation of crude oil or petroleum products usually present less of an impact on the environment than spills from tanker transportation. The probability of a spill is not necessarily less; however, the maximum amount of oil that can be released from a pipeline is generally less than that which can be released from a tanker. In addition, oil spilled on land generally causes less environmental impact than oil spilled on water. Thus, impacts can result in Class I or II impacts.

Failure rates for pipelines are generally described in terms of spills per unit length per year. Pipeline characteristics that can affect potential failure rates include age, size, design, depth of burial, corrosion protection, wall thickness, and operating temperature. A range of 0.03 to 0.5 release per year per 100 miles of pipeline has been cited in recent reports (ADL 1986; PPC 1991; U.S. Department of Agriculture [USDA] 1991; Aspen Environmental Group 1996).

Aspen, based on an analysis of pipeline spill statistics including the above referenced reports, presented the following spill estimates for pipelines with diameters greater than or equal to 16 inches:

- Leaks --
  - 0.08 per 100 miles per year for pipelines 40 years or older
  - 0.03 per 100 miles per year for “existing” pipelines (approximately 20 years old)
  - 0.012 per 100 miles per year for “new” pipelines (in first 10 years)
- Ruptures --
  - 0.04 per 100 miles per year for “old” pipelines
  - 0.016 per 100 miles per year for “existing” pipelines
  - 0.006 per 100 miles per year for “new” pipelines

A leak is defined as a relatively small rate of release from a pipeline. A typical cause would be a small hole that results in corrosion pitting, a leaking flange, or valve. A rupture represents a relatively high rate of release as might occur if the pipe were breached by an external force.

The maximum spill volume is a combination of drainage potential and the pumping rate for the period of time before the breached segment can be isolated. Worst-case calculations of spill volumes are normally based on the assumption of complete drainage by gravity of the section of pipe between high ground and the point of rupture (called drainage volume). Additional spillage depends on the flow rate and response time to shut down the pipeline. Analysis of drainage volume assumes that the drainage will be complete. This may not necessarily be the case because: (1) the breach may be less than a full rupture, (2) a block valve within the affected pipe section may be successfully closed before complete evacuation occurs, or (3) a check valve in an uphill stretch can prevent backflow of oil between high ground and the valve. The gradient of the terrain determines the hydrostatic force available to evacuate the pipe after the pumps are turned off. Evacuation will take much longer in nearly flat terrain. The average spill size from 16-inch-diameter crude oil pipelines, as reported to OPS between 1980 and 1990, was 2,680 bbls (USDA 1991). This is the volume in 2 miles of 16-inch pipe.

Mitigation Measures for OS-10:

**OS-10a:** Mitigation associated with the Shore facility would not be required. However, similar mitigation, as that described for the Proposed Project (OS-3 through OS-8), would be required at other terminals.

Rationale for Mitigation: As with the Proposed Project, the mitigation applied to the other terminals would lower the probability of spills and increase response capabilities at the other terminals.

Residual Impacts: Impacts associated with the Shore facility would be reduced, but impacts at other terminals would increase and have the potential to remain significant (Class I).

**OS-10b**: Mitigation for existing pipelines includes that presented in GEO-14, adhering to proper engineering design, inspection, maintenance, and retrofitting.

Rationale for Mitigation: The mitigation applied to the pipelines would lower the probability of spills.

Residual Impacts: Impacts would remain significant (Class I) for a large spill to land resources.

### 3.1.4.3 Modifications to Existing Pipelines for Continued Operation of Upland Facility Alternative

**Impact OS-11: Continued Shore Upland Operations via Modifications to Existing Pipelines**

**With no lease, impacts would be no potential for tanker spills at the Shore terminal, a beneficial (Class IV) impact; however, similar impacts would occur or be transferred to other area terminals and spill impacts would be as described in OS-8 (Class I and II). Impacts from use of existing pipelines that would first require modifications, would be significant (Class I or II) if a spill were to occur.**

As with the previous alternatives, the potential risks of using other marine terminals would be as discussed above in OS-9.

This alternative would involve the activation of a currently inactive pipeline. As stated above, the potential for pipeline releases is generally thought to be a function of pipeline length and thus, the activation of this line would increase the probability of a release from a pipeline. Pipeline risk was described in OS-10.

Spills from pipeline transportation of crude oil or petroleum products usually present less of an impact on the environment than spills from tanker transportation. The probability of a spill is not necessarily less; however, the maximum amount of oil that can be released from a pipeline is generally less than that which can be released from a tanker. In addition, oil spilled on land generally causes less environmental impact than oil spilled on water.

Because the PG&E line has not been used for over 15 years, it would most likely have to be surveyed with an instrumentation "smart" pig to evaluate its condition. Any sections that may have been damaged due to corrosion or some other means would have to be repaired or replaced and a significant (Class II) impact is assumed.

Pipeline leaks or spills can occur as a result of seismic activity as described in Section 3.11, Geological Resources and Structural Integrity. The potential consequences of pipeline leaks on other sensitive resources are described in other resource sections of this EIR.

<u>Mitigation Measures for OS-11</u>:

**OS-11a:** Mitigation associated with the Shore facility would not be required. However, similar mitigation, as that described for the Proposed Project (OS-3 through OS-8), would be required at other terminals.

<u>Rationale for Mitigation</u>: As with the Proposed Project, the mitigation applied to the other terminals would lower the probability of spills and increase response capabilities at the other terminals.

<u>Residual Impacts</u>: Impacts associated with the Shore facility would be reduced, but impacts at other terminals would increase and have the potential to remain significant.

**OS-11b**: Mitigation for existing pipelines includes that presented in GEO-14, adhering to proper engineering design, inspection, maintenance, and retrofitting.

<u>Rationale for Mitigation</u>: The mitigation applied to the pipelines would lower the probability of spills.

<u>Residual Impacts</u>: Impacts would remain significant (Class I) for a large spill to land resources.